# TECHNICAL CATALOG

## OF PIPES AND TUBULAR PRODUCTS

TMK is a leading supplier of steel piping, piping solutions and supporting services for different sectors of the economy. TMK produces ready-cut piping, including special pipes and other products for the energy, chemical, mechanical engineering, construction and other sectors. The company has wide-ranging expertise in the mechanical engineering sector, provides engineering solutions for power generation and metallurgical facilities and is developing a new line of products for the hydrogen energy sector.

TMK combines production sites and sales offices in Russia and abroad. It also owns several oil services companies, which together form its subsidiary TMK Neftegazservis. In addition to supplying its products, the company also provides a wide range of services in relation to the selection of piping products and the custom development of new designs, as well as supporting services including warehousing and pipe repair.

TMK is constantly uprading its scientific and technological skill base and is implementing advanced solutions with the support of an R&D center in Moscow and the Russian Research Institute of the Pipe Industry (RusNITI) in Chelyabinsk. The company is able to provide a full cycle of advanced piping solutions, from the initial concept development to testing and the launch of production.

# Contents

# 01.

## OCTG
## and Line pipes

# CASING

Casing is used to stabilize the wellbore during oil and gas well construction and operation

MANUFACTURERS

VTZ, STZ, SinTZ, TAGMET, CHTPZ, PNTZ

TMK-NGS are threaders, including Premium thread

**FEATURES**

Casing is joined by thread connections with couplings or without couplings (integral joint connections).

**Thread connections allow for:**

- pipes to be run into wells with complex trajectories, including high dogleg severity sections
- sufficient strength under all types of loads and required sealability of pipe connections in a string
- tools and devices for operations to be run inside the string.

Operational control at each stage of casing manufacture ensures compliance with ISO 9001 and API* Spec Q1 as well as high product quality.

Casing finishing lines are equipped with advanced process and control equipment.

**The following types of casing are available:**

- High-strength
- Low-temperature
- Corrosion-resistant
- High-performance
- With Premium thread connections
- Specialized
- Standard

TMK plants have a unique casing collapse test bench with a maximum hydraulic pressure of 2,000 atmospheres. At customer's request, the bench can be used to test pipes with diameters from 101.6 mm to 340 mm.

**Casing produced by TMK plants complies with:**

- API* Spec 5CT; API* Spec 5B
- GOST 632-80; GOST 31446-2017
- customer-approved technical specifications and corporate standards

At customer's request, coating can be applied to the external surface of casing.

All pipes are marked with paint and die stamping in line with the applicable technical standards.

Threads of supplied casing, couplings and box and pin ends of integral joint pipes are protected with storage compound and thread protectors. Metal, polymer or composite protectors can be used at customer's request.

## Standards

| Standards | Pipes size | | | | | Grade | Thread |
|---|---|---|---|---|---|---|---|
| | Outside diameter | | Wall thickness | | Length (m) | | |
| | Inches | mm | ppf | mm | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| API* Spec 5CT<br>Casing and Tubing | 4 ½” | 114.30 | 9.5; 10.5; 11.6; 13.5; 15.1 | 5.12; 5.69; 6.35; 7.37; 8.56 | 1, 2, 3 length ranges | J55; K55; L80 type 1; N80 type 1; N80 type Q; C90; R95; T95; C110; P110; Q125; TMK140 DW; TMK150 DW | BC; SC; LC; TMK UP CS; TMK UP FMC; TMK UP PF; TMK UP PF ET; TMK UP Simplex; TMK UP CWB; TMK UP CWB II; TMK UP 4; TMK UP Centum;TMK UP Centum ET; TMK UP Momentum FL; TMK UP Momentum; TMK UP Momentum GT |
| | 5” | 127.00 | 13.0; 15.0; 18.0; 21.4; 23.2; 24.1 | 6.43; 7.52; 9.19; 11.10; 12.14; 12.70 | | | BC; TMK UP CS; TMK UP FMC; TMK UP PF; TMK UP PF ET; TMK UP CWB; TMK UP CWB II; TMK UP Simplex; TMK UP Momentum; TMK UP Momentum FL; TMK UP Momentum GT |
| | 5 ½” | 139.70 | 14.0; 15.5; 17.0; 20.0; 23.0 | 6.2; 6.98; 7.72; 9.17; 10.54 | | | BC; TMK UP CS; TMK UP FMC; TMK UP PF; TMK UP PF ET; TMK UP CWB; TMK UP Centum; TMK UP Centum ET; TMK UP Simplex; TMK UP Momentum; TMK UP Momentum FL; TMK UP Momentum SFL; TMK UP Momentum GT |
| | 5 ¾” | 146.05 | 20.0; 24.0; 28.0; 32.0 | 7.0; 8.05 | | | BC; SC; LC; TMK UP FMC; TMK UP CS; TMK UP FMC; TMK UP PF; TMK UP PF ET; TMK UP Simplex; TMK UP CWB; TMK UP CWB II; TMK UP 4 |
| | 6 5/8” | 168.28 | 20.0; 21.25; 24.00; 28.00; 32.00 | 7.32; 8.0; 8.94; 10.59; 12.06 | | | BC; SC; LC; TMK UP CS; TMK UP FMC; TMK UP PF; TMK UP PF ET; TMK UP Simplex; TMK UP CWB; TMK UP CWB II; TMK UP 4; TMK UP Centum; TMK UP Centum ET; TMK UP Momentum FL; TMK UP Momentum SFL; TMK UP Momentum; TMK UP Momentum GT |
| | 7” | 177.80 | 20.0; 23.0; 26.0; 29.0; 32.0; 35.0; 38.0 | 6.91; 8.05; 9.19; 10.36; 11.51; 12.05; 12.65; 13.72 | | | |
| | 7 5/8” | 193.68 | 26.4; 29.7; 33.7; 39.0; 42.8; 45.3; 47.0 | 8.33; 9.52; 10.54; 10.92; 12.0; 12.70; 14.27; 15.11; 15.88 | | H40; J55; K55; M65; L80 type 1; L80 type 13Cr; N80 type Q; N80; C90; R95; P110; C110; T95; Q125; L80S; TMK140 DW; TMK150 DW | LC; SC; TMK UP FMC; TMK UP PF; TMK UP PF ET; TMK UP CWB; TMK UP CWB II; TMK UP Centum; TMK UP Simplex; TMK UP Momentum FL; TMK UP Momentum SFL |
| | 8 5/8” | 219.08 | 32.0; 36.0; 40.0; 44.0; 49.0 | 8.94; 10.16; 11.43; 12.70; 14.15 | | | BC; plain-end; LC; SC; TMK UP FMC; TMK UP PF; TMK UP PF ET; TMK UP Centum; TMK UP Magna |
| | 9 5/8” | 244.48 | 32.3; 36.0; 40.0; 43.5; 47.0; 53.5; 58.4 | 7.92; 8.94; 10.03; 11.05; 11.99; 13.84; 15.11 | | | LC; SC; BC; plain-end; TMK UP FMC; TMK UP PF; TMK UP PF ET; TMK UP Simplex; TMK UP CWB II; TMK UP Centum; TMK UP Momentum, TMK UP Momentum FL; TMK UP Momentum SFL; TMK UP Momentum GT; TMK UP Magna |
| | 9 7/8” | 250.83 | 62.8; 66.4 | 15.88; 16.79 | | | LC; SC; BC; plain-end; TMK UP FMC; TMK UP PF; TMK UP PF ET; TMK UP Centum; TMK UP Magna |
| | 10 ¾” | 273.05 | 40.5; 45.5; 51.0; 55.5; 60.7; 65.7; 73.20 | 8.89; 10.16; 11.43; 12.57; 13.84; 15.11; 17.07 | | | BC; plain-end; LC; SC; TMK UP FMC; TMK UP PF; TMK UP PF ET; TMK UP Simplex; TMK UP CWB; TMK UP CWB II; TMK UP Centum; TMK UP Momentum FL, TMK UP Momentum GT; TMK UP Magna |
| | | 301.63 | | 13.97; 14.78 | | | BC; LC; SC; plain-end; TMK UP PF; TMK UP PF ET |
| | 13 3/8” | 339.72 | 48.0; 54.5; 61.0; 68.0; 72.0 | 8.38; 9.65; 10.92; 12.19; 13.06 | | | BC; LC; SC; plain-end; TMK UP FMC; TMK UP PF; TMK UP PF ET; TMK UP Simplex; TMK UP CWB; TMK UP CWB II; TMK UP Centum; TMK UP Magna |
| | 16” | 406.40 | 75.0; 84.0; 109.0 | 14.38 | | | TMK UP Momentum FL |
| | | | | 11.13; 12.57; 16.66 | | | Plain-end; TMK UP Magna |
| GOST 632-80<br>Casing and couplings | | 114.3 | | 5.2; 5.7 | 8.0-12.5 | D | Short round thread; OTTM; OTTG; long round thread |
| | | | | 6.4 | | D; Ye; L; M | |
| | | | | 7.4; 8.6; 10.2 | | D; K; Ye; L; M; R | |
| | | 127.0 | | 5.6 | | D | |
| | | | | 6.4 | | D; Ye; L; M | |
| | | | | 7.5; 9.2; 10.2 | | D; K; Ye; L; M; R | |
| | | | | 10.7 | | D; K; Ye; L; M | |
| | | 139.7 | | 6.2 | | D | |
| | | | | 7.0 | | D; K; Ye; L; M | |
| | | | | 7.7; 9.2; 10.5 | | D; K; Ye; L; M; R | |
| | | 146.05 | | 6.5 | | D | |
| | | | | 7.7 | | D; K; Ye; L | |
| | | | | 7.0; 7.7; 8.5; 9.5; 10.7 | | D; K; Ye; L; M | |
| | | 168.28 | | 7.3; 8.0; 8.9; 10.6; 12.1 | | D; K; Ye; L; M; R | |
| | | 177.8 | | 8.1; 9.2; 10.4; 11.5 | | D; K; Ye; L; M; R | |
| | | | | 12.7; 13.7 | | D; K; Ye; L; M; R | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |

## Standards (continued)

| Standards | Pipes size | | | | Length (m) | Grade | Thread |
|---|---|---|---|---|---|---|---|
| | Outside diameter | | Wall thickness | | | | |
| | Inches | mm | ppf | mm | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| GOST 632-80<br>Casing and couplings | | 193.68 | | 7.6; 8.3 | 6.0-12.5 | D; K; Ye; L | Short round thread; OTTM; OTTG; long round thread |
| | | | | 9.5; 10.9; 12.7 | | D; K; Ye; L | |
| | | 219.08 | | 7.7; 8.9; 10.2; 11.4; 12.7; 14.2 | | D; K; Ye; L; M; R | |
| | | 244.48 | | 7.9; 8.9; 10.0; 11.1 | | D; K; Ye; L; M; R | |
| | | | | 12.0; 13.8; 14.2; 15.9 | | | |
| | | 273.05 | | 8.9; 10.2; 11.4; 12.6; 13.8; 15.1; 16.5 | | D; K; Ye; L; M; R | |
| | | 323.85 | | 8.5 | | D | |
| | | | | 9.5 | | D; Ye; L | |
| | | | | 11.0; 12.4; 14.0 | | D; K; Ye; L; M; R | |
| | | 339.72 | | 9.7; 10.9; 12.2; 13.1 | | D; Ye; L; M; R | |
| GOST 31446-2017<br>Steel casing and tubing for petroleum and natural gas industries.<br>General specifications (effective date: July 01, 2018) | | 114.3 | | 6.35; 7.37; 8.56 | 1, 2, 3 length ranges | H40; J55; K55; L80 type 1; N80 type Q; C90; R95; T95; P110; Q125; Q135 L80S; TMK140 DW; TMK150 DW | BC; SC; LC; TMK UP CS; TMK UP FMC; TMK UP PF; TMK UP PF ET; TMK UP Simplex; TMK UP CWB; TMK UP CWB II; TMK UP 4; TMK UP Centum, TMK UP Centum ET, TMK UP Momentum FL; TMK UP Momentum; TMK UP Momentum GT |
| | | 127.0 | | 6.43; 7.52; 9.19; 11.1; 12.4; 12.7 | | | BC; OTTM, OTTG; TMK UP CS; TMK UP FMC; TMK UP PF; TMK UP PF ET, TMK UP CWB; TMK UP CWB II; TMK UP Simplex; TMK UP Momentum; TMK UP Momentum FL; TMK UP Momentum GT |
| | | 139.7 | | 6.2; 6.98; 7.72; 9.17; 10.54 | | | BC, OTTM, OTTG; TMK UP CS; TMK UP FMC; TMK UP PF; TMK UP PF ET; TMK UP CWB; TMK UP Centum; TMK UP Centum ET; TMK UP Simplex; TMK UP Momentum; TMK UP Momentum FL; TMK UP Momentum SFL; TMK UP Momentum GT |
| | | 146.05 | | 6.5; 7.0; 7.7; 8.5; 9.5; 10.7 | | | BC; TMK UP FMC; SC; LC; TMK UP CS; TMK UP FMC; TMK UP PF; TMK UP PF ET; TMK UP Simplex; TMK UP CWB; TMK UP CWB II; TMK UP 4 |
| | | 168.28 | | 7.32; 8.0; 8.94; 10.59; 12.06 | | | BC; SC; LC; TMK UP CS; TMK UP FMC; TMK UP PF; TMK UP PF ET; TMK UP Simplex; TMK UP CWB; TMK UP CWB II; TMK UP 4; TMK UP Centum; TMK UP Centum ET; TMK UP Momentum FL; TMK UP Momentum SFL; TMK UP Momentum; TMK UP Momentum GT |
| | | 177.8 | | 6.91; 8.0; 8.05; 9.19; 10.36; 11.51; 12.65; 13.72 | | | |
| | | 193.68 | | 8.33; 9.52; 10.54; 10.92; 12.0; 12.7; 14.27; 15.11; 15.88 | | J55, K55, N80 type Q, N80 type 1, R95, P110, TMK150 DW | LC; SC; OTTM; OTTG; TMK UP FMC; TMK UP PF; TMK UP PF ET; TMK UP CWB; TMK UP CWB II; TMK UP Centum; TMK UP Simplex; TMK UP Momentum FL; TMK UP Momentum SFL |
| | | 219.08 | | 8.94; 10.16; 11.43; 12.70 | | J55; K55; N80 type Q | OTTM; OTTG; BC; plain-end; TMK UP PF; TMK UP PF ET; TMK UP FMC; TMK UP Centum; TMK UP Magna |
| | | | | 14.15 | | J55; K55; L80 type 1; R95 | OTTM; OTTG; BC; plain-end; TMK UP PF; TMK UP PF ET; TMK UP FMC |
| | | 244.48 | | 7.92; 8.94; 10.03; 11.05; 11.99; 13.84; 15.11 | | J55, K55, N80 type Q, N80 type 1, R95, P110, TMK150 DW | LC; SC; OTTM; OTTG; TMK UP FMC; TMK UP PF; TMK UP PF ET; TMK UP CWB; TMK UP CWB II; TMK UP Centum; TMK UP Simplex; TMK UP Momentum, TMK UP Momentum FL, TMK UP Momentum SFL; TMK UP Momentum GT; TMK UP Magna |
| | | 273.05 | | 8.89; 10.16; 11.43; 12.57; 13.84; 15.11; 17.07 | | | LC; SC; OTTM; OTTG; TMK UP FMC; TMK UP PF; TMK UP PF ET; TMK UP CWB; TMK UP CWB II; TMK UP Centum; TMK UP Simplex; TMK UP Momentum FL, TMK UP Momentum GT; TMK UP Magna |
| | | 323.85 | | 8.50 | | J55; K55; P110 | OTTM; BC; plain-end; TMK UP Simplex; TMK UP CWB; TMK UP CWB II; TMK UP Magna |
| | | | | 9,50; 11,00; 12,40; 14,0 | | J55, K55, L80 type 1, N80 type Q, R95, P110 | OTTM; OTTG; BC; plain-end; TMK UP FMC, TMK UP PF; TMK UP PF ET; TMK UP Centum; TMK UP Simplex; TMK UP CWB; TMK UP CWB II; TMK UP Magna |
| | | 339.72 | | 9.65; 10.92; 12.19; 13.06 | | J55, K55, N80 type Q, N80 type 1, L80S; R95; P110; TMK140 DW; TMK150 DW | LC; SC; OTTM; OTTG; TMK UP FMC; TMK UP PF; TMK UP PF ET; TMK UP CWB; TMK UP CWB II; TMK UP Centum; TMK UP Simplex; TMK UP Magna |
| | | 406.40 | | 11.13; 12.57; 16.66 | | | Plain-end, TMK UP Magna |
| | | | | 14.38 | | | TMK UP Momentum FL |
| | | 425.45 | | 11 | | | Plain-end; TMK UP Magna |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |

## Standards (continued)

| Standards | Pipes size | | | | | Grade | Thread |
|---|---|---|---|---|---|---|---|
| | Outside diameter | | Wall thickness | | Length (m) | | |
| | Inches | mm | ppf | mm | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| STO TMK-PS 82105964-005-2012<br>Casing (grades TMK 140, TMK 150) for deep and ultra-deep wells | | 114.3 | | 7.37 | 8.56 | TMK140DW; TMK150DW | BC; TMK UP FMC; TMK UP GF; TMK UP PF; TMK UP CWB |
| | | 177.8 | | 8.05; 9.19; 10.36; 11.51; 12.65 | 7.62-11.8 | | |
| | | 139.7 | | 6.98 | 10.54 | | |
| | | 168.28 | | 7.32 | 12.06 | | |
| | | 193.68 | | 9.52 | 12.70 | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |

## Mechanical properties of casing

| Grades | Tensile strength | | Yield strength | | Elongation %, min |
|---|---|---|---|---|---|
| | Metric units, MPa, min | Imperial units, ksi | Metric units, MPa | Imperial units, ksi | |
| API* Spec 5 CT | | | | | |
| J55 | 517 | 75 | 379-552 | 55-80 | * |
| K55 | 655 | 95 | 379-552 | 55-80 | * |
| L80-1 | 655 | 95 | 552-655 | 80-95 | * |
| N80; N80Q | 689 | 110 | 552-758 | 80-110 | * |
| R95 | 724 | 105 | 655-758 | 95-110 | * |
| P110 | 862 | 125 | 758-965 | 110-140 | * |
| Q125 | 931 | 135 | 862-1 034 | 125-150 | * |
| Q125 | 931 | | 862-1 034 | | * |
| GOST 632-80 | | | | | |
| D (mod. A) | 655 | | 379-552 | | 14.3 |
| K | 687 | | Min 490 | | 12.0 |
| Ye | 689 | | 552-758 | | 13.0 |
| L | 758 | | 655-862 | | 12.3 |
| M | 862 | | 758-965 | | 10.8 |
| R | 1 000 | | 930-1 137 | | 9.5 |
| GOST 31446-2017 | | | | | |
| J55 | 517 | | 379-552 | | - |
| K55 | 655 | | 379-552 | | - |
| M65 | 556 | | 448-586 | | - |
| L80-1 | 655 | | 552-655 | | - |
| L80 type 13Cr | 655 | 95 | 552 -65 | 80-955 | |
| N80; N80Q | 689 | | 552-758 | | - |
| C90 | 689 | | 621-724 | | - |
| R95 | 724 | | 655-758 | | - |
| T95 | 724 | 105 | 655-758 | 95-110 | |
| C110 | 793 | 115 | 758-826 | 110-120 | |
| P110 | 862 | | 758-965 | | - |
| Q125 | 931 | | 862-1 034 | | - |
| TMK Spec | | | | | |
| TMK 140 | 1 034 | | 965-1 103 | | * |
| TMK 150 | 1 103 | | 1034-1 172 | | * |

* Calculated as per API* Spec 5 CT.

# THERMALLY INSULATED CASING (THERMOCASES)

Thermally insulated casing ("thermocases") are used as conductor pipes in permafrost areas. Thermocases prevent wellbore soil thawing and reduce the permafrost thawing radius near the wellbore to ensure wellhead stability

**FEATURES**

Thermally insulated casing consists of two concentric tubes separated by polyurethane foam thermal insulation, end caps and a joint kit. The inner tube protrudes from the outer tube and is equipped with flanges or couplings to joint with another pipes. The joint area is closed with a metal cover, and space between the cover and the inner tube is filled with thermal insulation. Each thermally insulated casing is factory-made (including the metal structure and the thermal insulation layer). Thermal insulation is made of eco-friendly types of pour-in-place polyurethane foams based on ozone-friendly freons as well as Russian or imported freon-free polyurethane foams.

**APPLICATIONS:**

**Thermally insulated casing is used to ensure stability of the wellhead zone and to prevent complications resulting from near-wellhead formation sinking, including:**

- prevent near-wellhead sinkholes caused by thawing of subsiding, cavernous permafrost (ice layers, vein ice, ice-rich frozen ground, highly subsiding soils) near the surface with depths of no more than 100 m during well construction and operation
- develop well clusters that need to be located in areas prone to subsidence and prevent the joining of thawed permafrost areas of adjacent wells in the upper part of cryolithosphere during the cluster well operation
- maintain effective thermal operation modes of gas and oil wells

Uralchermet manufactures thermally insulated casing to the following specifications: TU 23.99.19-006-91076026-2017 Thermally Insulated Casing for Permafrost Zones and TU 24.20.22-013-91076026-2019 Thermally Insulated Casing for Permafrost Zones approved.

## Standards

| Standards | Pipes size | | Connection type |
|---|---|---|---|
| | Outer tube diameter (wall thickness), mm | Inner tube diameter (wall thickness), mm | |
| 1 | 2 | 3 | 4 |
| TU 23.99.19-006-91076026-2017<br>Thermally insulated conductor pipes for permafrost zones | 377 (10) | 244.48 (8.94) | Threaded (connection type at the Customer's request) |
| | 377 (7, 9, 10, 11) | 245 (8.9) | |
| | 426 (7, 10, 11, 12) | 245 (8.9) | |
| | 426 (7, 8, 10, 11) | 339.72 (9.65) | |
| | 473.08 (11.05) | 339.72 (9.65) | |
| | 530 (7, 7.5, 8) | 324 (9.5) | |
| | 530 (7, 8, 10) | 339.72 (9.65) | |
| | 530 (10) | 426 (11) | |
| | 630 (7, 7.5, 8, 10) | 426 (10, 11) | |
| | 630 (7, 8, 10) | 426 (7, 8, 11, 12) | Flanged |
| | 820 (10) | 630 (8) | |
| TU 24.20.22-013-91076026-2019<br>Thermally insulated casing for permafrost zones | 530 (8-10) | 323.85 (8.5-14.0) | Threaded (connection type at Customer's request) / Flanged |
| | 530 (8-10) | 339.7 (8.4-15.4) | |
| | 630 (8-10) | 426.0 (10.0-12.0) | |
| | 720 (8-15) | 508.0 (11.1-16.1) | |
| | 720 (8-15) | 530.0 (8.0-15.0) | |
| 1 | 2 | 3 | 4 |

# TUBING

Tubing is used in oil and gas wells to transport fluids inside casing, as well as for workover and for running diagnostic or workover tools into the well

MANUFACTURERS

SinTZ, TAGMET, CHTPZ, PNTZ

TMK-NGS are threaders, including Premium thread

**FEATURES**

Tubing is joined by thread connections with couplings.

**Thread tubing connections allow for:**

- pipes to be run into wells with complex trajectories, including high dogleg severity sections
- sufficient strength under all types of loads and required sealability of pipe connections in a string
- required wear resistance and maintainability

Operational control at each stage of tubing manufacture ensures compliance with ISO 9001 and API* Spec Q1 requirements as well as high product quality.

Tubing finishing lines are equipped with advanced process and control equipment. All tubing and couplings undergo nondestructive testing under applicable standards.

**The following versions of tubing and their combinations are available:**

- High-sealability
- Low-temperature
- Corrosion-resistant
- With external upset ends
- With polymeric sealing
- Standard
- With Premium thread connections

**Tubing made by TMK complies with the following standards:**

- API* Spec 5CT, API* Spec 5B
- GOST 633-80
- GOST 31446-2017
- Customer-approved technical specifications

At customer's request, anti-corrosion coating can be applied to the external surface of tubing.

All tubing is marked with paint and die stamping in line with the applicable technical standards.

Tubing is supplied with thread compound to protect the threaded joints of tubing and couplings, and thread protectors. Metal, polymer and/or combined protective parts can be used at customer's request.

At customer's request, pipes can be supplied in square bundles with reinforced polyethylene frames, tied with steel band. Pipes are supplied in hexagonal bundles with a mass of two to five tonnes.

## Standards

| Standards | Sizes | | | | | Grades | Connection |
|---|---|---|---|---|---|---|---|
| | Outside diameter, inches | Outside diameter, mm | Wall thickness ppf | Wall thickness mm | Length, m | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| API* Spec 5CT<br>Casing and tubing | 2 3/8 | 60.32 | 4.0; 4.6; 5.8 | 4.24; 4.83; 6.45; | R1 7.0 m-7.32 m; R2 8.53 m-9.75 m (up to 10.36 m); R3 11.58 m-12.8 m (max 12.05 m) | J55; L80 type 1; L80 type 13Cr; N80 type Q; C90; P110; T95; R95 | TMK UP PF; plain-end; threaded non-upset; threaded with external upset ends |
| | 2 7/8 | 73.02 | 6.4 | 5.51 | | J55-P110; L80 type 13Cr | TMK UP PF; plain-end; threaded non-upset; threaded with external upset ends |
| | | | 7.8 | 7.01 | | J55-P110 | |
| | | | 8.6 | 7.82 | | N80 type Q; C90; P110; T95 | |
| | 3 1/2 | 88.9 | 7.7 | 5.49 | | J55-P110 | TMK UP PF; TMK UP Centum ET; plain-end, threaded non-upset, threaded with external upset ends |
| | | | 9.2; 10.2 | 6.45; 7.34 | | J55-P110; L80 type 13Cr | |
| | | | 12.7 | 9.52 | | J55-L80; N80-P110 | |
| | | | 15.5 | 12.09 | | K55; R95; L80 type 1; L80 type 13Cr; N80 type Q; C90; T95 | |
| | 4 | 101.6 | 9.5; 10.7; 13.2 | 5.74; 6.65; 8.38 | | | TMK UP PF, TMK UP Centum ET, plain-end, threaded non-upset, threaded with external upset ends |
| | 4 1/2 | 114.3 | 12.6 | 6.88 | | J55-L80; N80-P110 | TMK UP PF, TMK UP Centum, TMK UP Centum ET, plain-end, threaded non-upse, threaded with external upset ends |
| | | | 15.2; 18.9 | 8.56; 10.92 | | J55; L80 type 1; L80 type 13Cr; N80 type Q; C90; P110; T95; R95 | |
| GOST 633-80<br>Seamless tubing pipes and couplings for them | | 33.4 | | 3.5 | Version A: 9.5-10.5 | D; K; Ye | NKT |
| | | 48.3 | | 4 | | | |
| | | 60.3 | | 5.0 | | | NKT; NKV; NKM |
| | | 73.0 | | 5.5 | | | |
| | | | | 7.0 | | D; K; Ye; L; M P | |
| | | 88.9 | | 6.5 | | | |
| | | | | 8.0 | | | NKV; NKM |
| | | 101.6 | | 6.5 | | | NKT; NKV; NKM |
| | | 114.3 | | 7.0 | | | NKT; NKM |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |

## Standards (continued)

| Standards | Pipes dimensions, pipes grades and end types | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Outside diameter, D | Wall thickness, S | J55 | K72 | L80 or 1 | N80 | | C90 | T95 | R95 | P110 |
| | mm | mm | | | | type 1 | type Q | | | | |
| | Tubing, end types: P - plain-end, N - for NU connection, U- for EU connection, K - for NKT connection, H - for NKTV connection, C - for NKM connection, F - for TMK UP FMT connection, R - for TMK UP PF connection, M - for TMK UP CENTUM connection, T - for TMK UP CENTUM ET connection | | | | | | | | | | |
| GOST 31446-2017<br>Steel casing and tubing for petroleum and natural gas industries. General specifications (Effective date: July 01, 2018) | 33.40 | 3.38 | PNK | – | – | PNK | – | – | – | – | – |
| | 33.40 | 3.50 | PK | PK | – | PK | – | – | – | – | – |
| | 33.40 | 4.55 | PK | – | – | P | – | – | – | – | – |
| | 48.26 | 3.68 | PNK | – | PNK | PNK | PNK | PN | PN | – | – |
| | 48.26 | 4.00 | PK | PK | PK | PK | PK | – | – | – | – |
| | 60.32 | 4.24 | PNK | – | PNK | PNK | PNK | PNK | PNK | – | – |
| | 60.32 | 4.83 | PNUKHCR | – | PNUKHCR | PNKCR | PNUKHCR | PNUKHCR | PNKCR | PKCR | PNUHCR |
| | 60.32 | 5.00 | PKHC | PKHC | PKHC | PKHC | PKHC | PKHC | PKC | PKC | PHC |
| | 60.32 | 6.45 | – | – | PNUKH | PNK | PNUKH | PNUKH | PNK | PK | PNUKH |
| | 73.02 | 5.51 | PNUKHCFR | PKHCFR | PNUKHCFR | PNKCFR | PNUKHCFR | PNUKHCFR | PNKCFR | PKCFR | PNUKHCFR |
| | 73.02 | 7.01 | PKHCFR | PKHCFR | PNUKHCFR | PNKCFR | PNUKHCFR | PNUKHCFR | PNKCFR | PKCFR | PNUKHCFR |
| | 73.02 | 7.82 | – | – | PNU | PNU | PNU | PNU | PN | – | PNU |
| | 88.90 | 5.49 | PNFR | FR | PNFRT | PNFRT | PNFRT | PNFRT | PNFRT | FRT | FRT |
| | 88.90 | 6.45 | PNUKHCFR | PKHCFR | PNUKHCFRT | PNKCFRT | PNUKHCFRT | PNUKHCFRT | PNKCFRT | PKCFRT | PNUKHCFRT |
| | 88.90 | 7.34 | PNUKHCFR | FR | PNUKHCFRT | PNKCFRT | PNUKHCFRT | PNUKHCFRT | PNKCFRT | PKCFRT | PKHCFRT |
| | 88.90 | 8.00 | PKHCFR | PHCFR | PKHCFRT | PKCFRT | PKHCFRT | PKHCFRT | PKCFRT | PKCFRT | PKHCFRT |
| | 88.90 | 9.52 | FR | FR | PNUKHCFRT | PNKCFRT | PNUKHCFRT | PNUKHCFRT | PNKCFRT | PKCFRT | PNUKHCFRT |
| | 101.60 | 5.74 | PNT | – | PNT | PNT | PNT | PNT | PNT | – | – |
| | 101.60 | 6.50 | PKHC | PKHC | PKHCRT | PKCRT | PKHCRT | PKHCT | PKCT | PKCRT | PKHCT |
| | 101.60 | 6.65 | PUKHC | – | PUKHCT | PKCT | PUKHCT | PUKHCT | PKCT | PKCT | PKHCT |
| | 114.30 | 6.88 | PNUKHCFR | FR | PNUKHCFRMT | PNKCFRMT | PNUKHCFRMT | PNUKHCFRMT | PNKCFRMT | PKCFRMT | PKHCFRMT |
| | 114.30 | 7.00 | PKHC | PKHC | PKHCMT | PKCMT | PKHCMT | PKHCMT | PKCMT | PKCMT | PKHCMT |

## Mechanical properties of tubing as per GOST 633-80

| Property | Mechanical properties required for steel grades | | | | | |
|---|---|---|---|---|---|---|
| | D (modification A) | K (NKT) | Ye | L | M | P |
| Yield strength. σy:<br>– min. MPa (kgf/cm²)<br>– max. MPa (kgf/cm²) | 379 (38.7)<br>552 (56.2) | 491 (50.0) | 552 (56.2)<br>758 (77.3) | 654 (66.8)<br>862 (87.9) | 724 (73.8)<br>921 (93.9) | 930 (94.9)<br>1137 (116.0) |
| Elongation. δ5. min % | 14.3 | 12.0 | 13.0 | 12.3 | 11.3 | 9.5 |

## Requirements for mechanical properties of tubing as per API* Spec 5CT and GOST 31446-2017

| Grade | Tensile strength | | Yield strength | |
|---|---|---|---|---|
| | Imperial units, ksi | Metric units, MPa | Imperial units, ksi | Metric units, MPa |
| H40 | 60 | 414 | 40-80 | 276-552 |
| J55 | 75 | 517 | 55-80 | 379-552 |
| K55 | 95 | 655 | 55-80 | 379-552 |
| K72 | | 687 | | min 491 |
| N80 type 1 | 100 | 689 | 80-110 | 552-758 |
| N80 type Q | 100 | 689 | 80-110 | 552-758 |
| M65 | | 586 | | 448-586 |
| L80 type 1 | 95 | 655 | 80-95 | 552-655 |
| L80 13Cr | 95 | 655 | 80-95 | 552-655 |
| C90 | | 689 | | 621-724 |
| R95 (API) | 105 | 724 | 95-110 | 655-758 |
| R95 (GOST) | | 758 | | 655-862 |
| T95 | 105 | 724 | 95-110 | 655-758 |
| C110 | 115 | 793 | 110-120 | 758-826 |
| P110 | 125 | 862 | 110-140 | 758-965 |
| Q125 | 135 | 931 | 125-150 | 862-1034 |
| Q 135 | | 1000 | | 930-1137 |

# VACUUM (VIT) AND NON-VACUUM INSULATED TUBING

Vacuum insulated tubing is designed for oil and gas production in permafrost areas to prevent soil thawing and, consequently, failure of the entire well infrastructure, as well as to prevent paraffin and gas hydrate plugging caused by a decrease in produced fluid temperature in the upper part of the well.

Insulated tubing is also used for thermal hydrocarbon recovery, in particular steam-assisted production of heavy (viscous) oil, to increase well flow rate

MANUFACTURERS

SinTZ

**FEATURES**

Insulated tubing (VIT) consists of two tubes, one (shell) inside the other (bearing tube). The tubes are joined by welding with multiple reflective layers in the sealed space between the tubes where deep vacuum is created to reduce thermal losses.

VIT strings are assembled using threaded couplings, including premium couplings, and bushings made of thermal insulation material.

TMK manufactures low-temperature insulated tubing, as well as insulated tubing made of martensitic 13CrL steels resistant to environments with high $CO_2$ content (TU 14-161-240-2018 and TU 14-161-243-2019). These products have been successfully field-tested and approved for commercial operation.

**Applications of insulated tubing:**

- Oil and gas field development in the most challenging production environments in permafrost zones, with high-viscosity or waxy hydrocarbons. This type of insulated tubing is used to prevent near-wellbore permafrost thawing and well infrastructure failure, as well as wax and gas hydrate plugs in the upper part of the wellbore
- For thermal hydrocarbon recovery, in particular steam-assisted production of heavy (viscous) oil, to increase well flow rate. This method requires downhole injection of fluid at a high temperature – up to 350°C
- Light Insulated Tubing, a non-vacuum version of insulated tubing, with reflective insulation between the tubes. Such products are used at oil and gas fields to transport fluids with temperatures up to 180°C

## Standards

| Standards | Sizes | | | | Grades | Connection |
|---|---|---|---|---|---|---|
| | OD of outside pipes (wall thickness) | | OD of inner pipes (wall thickness) | | | |
| | imperial units (inches, ppf) | Metric units (mm) | imperial units (labels) | Mm (labels) | | |
| TS 14-161-258-2020<br>Insulated tubing and couplings | 3 1/2 (9.2) | 88.9 (6.45) | | 48.26 (4) | J55, L80 type 1, L80 type 13Cr, N80 type Q, R95, P110 | Buttress or round thread for tubing as per API* 5B or Premium thread of TMK UP range |
| | 3 ½ (9.2) | 88.9 (6.45) | 2 3/8 (4.6) | 60.32 (4.83) | | |
| | 4 (10.7) | 101.6 (6.65) | 2 7/8 (6.4) | 73.02 (5.51) | | |
| | 4 ½ (12.6) | 114.3 (6.88) | 2 7/8 (6.4) | 73.02 (5.51) | | |
| | 4 ½ (11.6) | 114.3 (6.35) | 2 7/8 (6.4) | 73.02 (5.51) | | |
| | 4 ½ (12.6) | 114.3 (6.88) | 3 ½ (9.2) | 88.9 (6.45) | | |
| | 4 ½ (11.6) | 114.3 (6.35) | 3 ½ (9.2) | 88.9 (6.45) | | |
| | 5 (15) | 127 (7.52) | 3 ½ (9.2) | 88.9 (6.45) | | |
| | 5 ½ (17) | 139.7 (7.72) | 3 ½ (9.2) | 88.9 (6.45) | | |
| | 5 ½ (17) | 139.7 (7.72) | 4 (10.7) | 101.6 (6.65) | | |
| | 5 ½ (17) | 139.7 (7.72) | 4 1/2 (12.6) | 114.3 (6.88) | | |
| | 6 5/8 (24) | 168.28 (8.94) | 4 (10.6) | 101.6 (6.65) | | |
| | 6 5/8 (24) | 168.28 (8.94) | 4 1/2 (12.6) | 114.3 (6.88) | | |
| | 6 5/8 (24) | 168.28 (8.94) | 5 (15) | 127 (7.52) | | |
| | 7 (26) | 177.8 (9.19) | 5 (15) | 127 (7.52) | | |
| | 7 (23) | 177.8 (8.05) | 5 (15) | 127 (7.52) | | |
| | 7 (26) | 177.8 (9.19) | 5 1/2 (17) | 139.7 (7.72) | | |
| | 7 (23) | 177.8 (8.05) | 5 ½ (17) | 139.7 (7.72) | | |
| | 8 5/8 (36) | 219.08 (10.16) | 6 5/8 (24) | 168.28 (8.94) | | |
| | 9 5/8 (40) | 244.48 (10.03) | 6 5/8 (24) | 168.28 (8.94) | | |

# DRILL PIPES

Drill pipes with friction welded joints are intended for oil and gas production and exploration well construction and workover, sidetracking, drilling deviated and horizontal wells, and various operations in wells.

Pipes are available with internal, external or internal-external upsets, diameters from 50 mm to 139 mm, wall thicknesses from 5.5 mm to 12.7 mm, pipes grades from D to R in accordance with GOST R 50278 and TU or pipes grades from D to S in accordance with GOST 32696, or pipes grades from E to S in accordance with API* Spec 5DP

MANUFACTURERS

SinTZ, TAGMET

**FEATURES**

Drill pipes are connected by tool joints with special thread. Pipes body ends are upset externally, internally or both internally and externally before tool joints are welded.

Drill pipes are seamless, made of carbon or alloy steels by friction welding of tool joints to upset ends of the drill pipes body.

TMK drill pipes and tool joints comply with the applicable specifications.

Drill pipes are protected against atmospheric corrosion by special protective coatings, including colorless varnish.

Tool joint threads are protected by rust-preventive compound and polymeric or metallic protectors.

At customer's request, pipes can be supplied with hard-faced boxes and/or pins of tool joints, copper-plated tool joint threads, following a break-in procedure consisting of making up / breaking out the connection three times, or cold rolling of thread roots.

At customer's request, pipes can be supplied in square bundles with frames, tied with steel band.

## Standards

| Standards | Pipes size | | Length range,m | Grade | Tool joint | Upset type |
|---|---|---|---|---|---|---|
| | Outside diameter, mm (inches) | Wall thickness mm (ppf) | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| API* Spec 5DP, second edition<br>Drill pipes | 60.33 (2 3/8) | 7.11 (6.65) | Range 2 (9.14-9.75); Range 3 (12.19-12.5) | E; X; G | As per API* Spec 5DP and Tables 2 and 3 | EU |
| | 73.03 (2 7/8) | 9.19 (10.4) | | E; X; G; S | | EU |
| | 88.90 (3 ½) | 9.35 (13.3) | | E; X; G | | EU |
| | | 11.40 (15.5) | | E; X; G | | EU |
| | 101.60 (4) | 8.38 (14) | | E; X; G; S | | IU |
| | 114.30 (4 ½) | 8.56 (16.6); 10.92 (20) | 8.84-12.9 | E; X; G;S | | IEU |
| | 127.00 (5) | 9.19 (19.5); 12.7 (25.6) | 8.84-12.9 | E; X; G; S | | IEU |
| | 139.70 (5 ½) | 9.17 (21.7); 10.54 (24.7) | 8.84-12.9 | E; X; G; S | | IEU |
| GOST 32696-2014<br>Steel drill pipes for petroleum and natural gas industries | 60.32 (2 3/8) | 7.11 (6.65) | Range 2 9.14-9.75; Range 3 12.19-12.5 | D; E; X; G | NC 26 3-73 (OD85.7xID44.5) | EU |
| | 73.02 (2 7/8) | 9.19 (10.4) | | D; E | NC 31 3-86 (OD104.8xID54.0) | |
| | | | | X; G | NC 31(OD104.8xID50.8) | |
| | | | | S | NC 31(OD111.1xID41.3) | |
| | 88.90 (3 ½) | 9.35 (13.3) | | D; E | NC38 3-102 (0D120.7xID68.3) | |
| | | | | X | NC 38(OD127.0xID65.1) | |
| | | | | G | NC 38(OD127.0xID61.9) | |
| | | | | S | NC 38(OD127.0xID54.0) | |
| | | 11.40 (15.5) | | D; E | NC 38(OD127.0xID65.1) | |
| | | | | X | NC 38(OD127.0xID61.9) | |
| | | | | G | NC 38(OD127.0xID54.0) | |
| | 101.60 (4) | 8.38 (14) | | D; E | NC 40 3-108<br>NC 40(OD133.4xID71.4) | IU |
| | | | | X | NC 40(OD133.4xID68.3) | IU |
| | | | | G | NC 40(OD139.7xID61.9) | IU |
| | | | | S | NC 40 (OD139.7xID50.8) | IU |
| | 114.3 (4½) | 8.56 (16.6) | Range 2 8.84-9.75; Range 3 12.19-12.50 | D; E | NC 46 (OD158.8xID82.6) | IEU |
| | | | | X | NC 46 (OD158.8xID76.2) | |
| | | | | G | NC 46(OD158.8xID76.2) | |
| | | | | D; E | NC 46(OD158.8xID82.6) | |
| | | | | X | NC 46(OD158.8xID76.2) | |
| | | | | G | NC 46(OD158.8xID76.2) | |
| | | 10.92 (20) | | D; E | NC 46 (OD158.8xID76.2) | |
| | | | | D; E | NC 46 (OD158.8xID76.2) | |
| | 127 (5) | 9.19 (19.5) | | D; E | NC 50 (OD168.3xID95.3) | |
| | | | | X | NC 50 (OD168.3xID88.9) | |
| | | | | G | NC 50 (OD168.3xID82.6) | |
| | | | | S | NC 50 (OD168.3xID69.9) | |
| | | | | E; X; G | 5 1/2 FH (OD177.8xID95.3) | |
| | | | | S | 5 1/2 FH (OD184.2xID88.9) | |
| | | 12.70 (25.6) | | X | NC 50 (OD168.3xID76.2) | |
| | | | | G | NC 50 (OD168.3xID69.9) | |
| | | | | E; X | 5 1/2 FH (OD177.8xID88.9) | |
| | | | | G | 5 1/2 FH (OD184.2xID88.9) | |
| | | | | S | 5 1/2 FH (OD184.2xID82.6) | |
| | 139.7 (5 ½) | 9.17 (21.7) | | D; E; X; G | 5 1/2 FH (OD184.2xID101.2) | |
| | | 10.54 (24.7) | | | | |
| GOST R 50278-92<br>Drill pipes with weld-on tool joints | 60.3 | 7.1 | 8.0-8.6; 9.0-9.45; 11.9-12.5 | D; Ye; L; M | As per Tables 1 and 2 | EU |
| | 73.0 | 9.2 | | D; Ye; L; M; R | | |
| | 88.9 | 9.4*; 11.4 | | D; Ye; L; M | | |
| | 101.6 | 8.4 | | | | |
| | 114.3<br>127.0 | 8.6; 10.9<br>9.2; 12.7 | | | | |
| | 88.9 | 9.4; 11.4 | 8.0-8.6; 9.0-9.45; 11.9-12.5 | | | IU |
| | 101.6 | 8.4 | | | | |
| | 114.3 | 8.6; 10.9 | 8.0-8.6; 9.0-9.45; 11.9-12.5 | | | IEU |
| | 127.0 | 9.2; 12.7 | | | | |
| | 139.7 | 9.2; 10.5 | | | 3-105-57 | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

## Standards (continued)

| Standards | Pipes dimensions | | Length; m | Grade | Joint type | Upset type |
|---|---|---|---|---|---|---|
| | Nominal outside diameter; mm | Wall thickness; mm | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| TU 14-157-107-2009<br>TMK UP TDS drill pipes with weld-on tool joints | 88.9 | 9.35 | 8.0-8.6<br>11.9-12.5 | E; X; G; S;<br>D; Ye; L; M; R | TMK UP TDS<br>TMK UP TDSA<br>TMK UP TDSM<br>TMK UP TDSAM | IU;EU; IEU |
| | 101.6 | 8.4 | | | | |
| | 114.3 | 8.6; 10.9 | | | | |
| | 127.0 | 9.19; 12.7 | | | | |
| | 139.7 | 9.2; 10.5 | | | | |
| | | 6.5 | | Д; E | ЭП-121М-73 | |
| TU 14-161-235-2009<br>TMK UP TDS drill pipes with weld-on tool joints | 60.3 | 7.1 | 8.0-8.6;<br>9.0-9.45;<br>11.9-12.5 | D; Ye; L; M | TMK UP TDS 86-44 | EU |
| | 73.0 | 9.2 | | D; Ye; L; M | TMK UP TDS 105-54 | EU |
| | | | | L; M | TMK UP TDS 105-51 | |
| | 88.9 | 9.4 | | P | TMK UP TDS 127-54 | EU |
| | | | | L; M | TMK UP TDS 127-65 | |
| | | | | M; R | TMK UP TDS 127-62 | |
| | | 11.4 | | D; Ye; L | TMK UP TDS 127-65 | |
| | | | | L; M | TMK UP TDS 127-62 | |
| | | | | P | TMK UP TDS 127-54 | |
| | 73.0 | 9.2 | | D; Ye | TMK UP TDS 92-34 | IU |
| | 88.9 | 9.4 | | D; Ye | TMK UP TDS 108-44 | IU |
| | | | | D; Ye | TMK UP TDS 108-51 | IU |
| | | | | P | TMK UP TDS 127-54 | EU |
| | | 11.4 | | D; Ye | TMK UP TDS 108-41 | IU |
| | | | | D; Ye | TMK UP TDS 108-51 | IU |
| | 101.6 | 8.4 | | D; Ye | TMK UP TDS 133-71 | IU |
| | | | | L; M | TMK UP TDS 133-68 | |
| | | | | M; R | TMK UP TDS 140-62 | |
| | 114.3 | 8.6 | | L; M | TMK UP TDS 159-76 | IEU |
| | | 10.9 | | D; Ye | TMK UP TDS 159-76 | |
| | | | | L; M; R | TMK UP TDS 159-70 | |
| | 127.0 | 9.2 | | D; Ye | TMK UP TDS 162-95-2 | IEU |
| | | | | L; M | TMK UP TDS 162-89-2 | |
| | | | | M; R | TMK UP TDS 165-83 | |
| | | 12.7 | | L; M | TMK UP TDS 165-76 | |
| | 60.32 | 7.11 | | E; X; G | TMK UP TDSA 86-44 | EU |
| | 73.02 | 9.19 | | E | TMK UP TDSA 105-54 | EU |
| | | | | X; G | TMK UP TDSA 105-51 | EU |
| | 88.9 | 9.35 | | X; G | TMK UP TDSA 127-65 | EU |
| | | | | G; S | TMK UP TDSA 127-62 | |
| | | | | S | TMK UP TDSA-127-54 | |
| | | 11.4 | | X; G | TMK UP TDSA 127-62 | |
| | | | | G; S | TMK UP TDSA 127-54 | |
| | | | | E; X | TMK UP TDSA 127-65 | |
| | 101.60 | 8.38 | | E | TMK UP TDSA 133-71 | IU |
| | | | | X; G | TMK UP TDSA 133-68 | |
| | | | | G; S | TMK UP TDSA 140-62 | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

## Table 1 – Size classes, main dimensions and weights of TMK UP TDS tool joints

| Joint type | Thread type | Tool joint OD, D2, mm | Tool joint ID, D1, mm | Tool joint length, L1, mm | Tool joint weight, kg |
|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 |
| TMK TDS-86-44 | 3-73 | 85.7 | 44.5 | 511 | 14.4 |
| TMK TDSA-86-44 | NC-26 | 85.70 | 44.45 | 511 | 14.4 |
| TMK TDSM-86-44 | 3-73 | 85.7 | 44.5 | 696 | 20.5 |
| TMK TDSAM-86-44 | NC-26 | 85.70 | 44.45 | 696 | 20.5 |
| TMK TDS-92-34 | 3-73 | 92.0 | 34.0 | 511 | 21.0 |
| TMK TDSM-92-34 | 3-73 | 92.0 | 34.0 | 696 | 30.2 |
| TMK TDS-95-32 | 3-73 | 95.2 | 31.8 | 511 | 22.8 |
| TMK TDSM-95-32 | 3-73 | 95.2 | 31.8 | 696 | 32.0 |
| TMK TDS-105-54 | 3-86 | 104.8 | 54.0 | 536 | 23.4 |
| TMK TDSA-105-54 | NC-31 | 104.80 | 53.98 | 536 | 23.4 |
| TMK TDSM-105-54 | 3-86 | 104.8 | 54.0 | 721 | 33.9 |
| TMK TDSAM-105-54 | NC-31 | 104.80 | 53.98 | 721 | 33.9 |
| TMK TDS-105-51 | 3-86 | 104.8 | 50.8 | 536 | 24.3 |
| TMK TDSA-105-51 | NC-31 | 104.80 | 50.80 | 536 | 24.3 |
| TMK TDSM-105-51 | 3-86 | 104.8 | 50.8 | 721 | 33.9 |
| TMK TDSAM-105-51 | NC-31 | 104.80 | 50.80 | 721 | 33.9 |
| TMK TDS-108-44 | 3-86 | 108.0 | 44.5 | 536 | 29.6 |
| TMK TDSM-108-44 | 3-86 | 108.0 | 44.5 | 721 | 40.7 |
| TMK TDS-108-41 | 3-86 | 108.0 | 41.3 | 536 | 30.4 |
| TMK TDSM-108-41 | 3-86 | 108.0 | 41.3 | 721 | 41.7 |
| TMK TDS-127-65 | 3-102 | 127.0 | 65.1 | 600 | 39.1 |
| TMK TDSA-127-65 | NC-38 | 127.00 | 65.09 | 600 | 39.1 |
| TMK TDSM-127-65 | 3-102 | 127.0 | 65.1 | 785 | 52.6 |
| TMK TDSAM-127-65 | NC-38 | 127.00 | 65.09 | 785 | 52.6 |
| TMK TDS-127-62 | 3-102 | 127.0 | 61.9 | 600 | 40.6 |
| TMK TDSA-127-62 | NC-38 | 127.00 | 61.91 | 600 | 40.6 |
| TMK TDSM-127-62 | 3-102 | 127.0 | 61.9 | 785 | 54.7 |
| TMK TDSAM-127-62 | NC-38 | 127.00 | 61.91 | 785 | 54.7 |
| TMK TDS-127-54 | 3-102 | 127.0 | 54.0 | 600 | 43.8 |
| TMK TDSA-127-54 | NC-38 | 127.00 | 53.98 | 600 | 43.8 |
| TMK TDSM-127-54 | 3-102 | 127.0 | 54.0 | 785 | 58.9 |
| TMK TDSAM-127-54 | NC-38 | 127.00 | 53.98 | 785 | 58.9 |
| TMK TDS-133-68 | 3-108 | 133.4 | 68.3 | 577 | 41.9 |
| TMK TDSA-133-68 | NC-40 | 133.40 | 68.26 | 577 | 41.9 |
| TMK TDSM-133-68 | 3-108 | 133.4 | 68.3 | 762 | 56.3 |
| TMK TDSAM-133-68 | NC-40 | 133.40 | 68.26 | 762 | 56.3 |
| TMK TDS-140-62 | 3-108 | 139.7 | 61.9 | 577 | 48.8 |
| TMK TDSA-140-62 | NC-40 | 139.70 | 61.91 | 577 | 48.8 |
| TMK TDSM-140-62 | 3-108 | 139.7 | 61.9 | 762 | 66.7 |
| TMK TDSAM-140-62 | NC-40 | 139.70 | 61.91 | 762 | 66.7 |
| TMK TDS-152-83 | 3-122 | 152.4 | 82.6 | 577 | 53.5 |
| TMK TDSA-152-83 | NC-46 | 152.40 | 82.55 | 577 | 53.5 |
| TMK TDSM-152-83 | 3-122 | 152.4 | 82.6 | 762 | 72.2 |
| TMK TDSAM-152-83 | NC-46 | 152.40 | 82.55 | 762 | 72.2 |
| TMK TDS-152-76 | 3-122 | 152.4 | 76.2 | 577 | 57.0 |
| TMK TDSA-152-76 | NC-46 | 152.40 | 76.20 | 577 | 57.0 |
| TMK TDSM-152-76 | 3-122 | 152.4 | 76.2 | 762 | 76.8 |
| TMK TDSAM-152-76 | NC-46 | 152.40 | 76.20 | 762 | 76.8 |
| TMK TDS-159-83 | 3-122 | 158.8 | 82.6 | 577 | 60.0 |
| 1 | 2 | 3 | 4 | 5 | 6 |

## Table 1 – Size classes, main dimensions and weights of TMK UP TDS tool joints (**continued**)

| Joint type | Thread type | Tool joint OD, D2, mm | Tool joint ID, D1, mm | Tool joint length, L1, mm | Tool joint weight, kg |
|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 |
| TMK TDSA-159-83 | NC-46 | 158.75 | 82.55 | 577 | 60.0 |
| TMK TDSM-159-83 | 3-122 | 158.8 | 82.6 | 762 | 80.9 |
| TMK TDSAM-159-83 | NC-46 | 158.75 | 82.55 | 762 | 80.9 |
| TMK TDS-159-76 | 3-122 | 158.8 | 76.2 | 577 | 63.5 |
| TMK TDSA-159-76 | NC-46 | 158.75 | 76.20 | 577 | 63.5 |
| TMK TDSM-159-76 | 3-122 | 158.8 | 76.2 | 762 | 85.7 |
| TMK TDSAM-159-76 | NC-46 | 158.75 | 76.2 | 762 | 85.7 |
| TMK TDS-159-70 | 3-122 | 158.8 | 69.9 | 577 | 66.6 |
| TMK TDSA-159-70 | NC-46 | 158.75 | 69.85 | 577 | 66.6 |
| TMK TDSM-159-70 | 3-122 | 158.8 | 69.9 | 762 | 89.8 |
| TMK TDSAM-159-70 | NC-46 | 158.75 | 69.85 | 762 | 89.8 |
| TMK TDS-162-95-1 | 30-133 | 161.9 | 95.3 | 577 | 52.6 |
| TMK TDSA-168-95-1 | NC-50 | 168.28 | 95.25 | 577 | 58.3 |
| TMK TDSM-162-95-1 | 30-133 | 161.9 | 95.3 | 762 | 72.2 |
| TMK TDSAM-168-95-1 | NC-50 | 168.28 | 95.25 | 762 | 80.3 |
| TMK TDS-162-95-2 | 30-133 | 161.9 | 95.3 | 577 | 53.3 |
| TMK TDSA-168-95-2 | NC-50 | 168.28 | 95.25 | 577 | 59.0 |
| TMK TDSM-162-95-2 | 30-133 | 161.9 | 95.3 | 762 | 72.9 |
| TMK TDSAM-168-95-2 | NC-50 | 168.28 | 95.25 | 762 | 81.0 |
| TMK TDS-162-92 | 30-133 | 161.9 | 92.1 | 577 | 54.7 |
| TMK TDSA-168-92 | NC-50 | 168.28 | 92.08 | 577 | 60.4 |
| TMK TDSM-162-92 | 30-133 | 161.9 | 92.1 | 762 | 74.9 |
| TMK TDSAM-168-92 | NC-50 | 168.28 | 92.08 | 762 | 83.0 |
| TMK TDS-162-89-1 | 30-133 | 161.9 | 88.9 | 577 | 56.6 |
| TMK TDSA-168-89-1 | NC-50 | 168.28 | 88.9 | 577 | 62.3 |
| TMK TDSM-162-89-1 | 30-133 | 161.9 | 88.9 | 762 | 77.5 |
| TMK TDSAM-168-89-1 | NC-50 | 168.28 | 88.9 | 762 | 85.6 |
| TMK TDS-162-89-2 | 30-133 | 161.9 | 88.9 | 577 | 57.2 |
| TMK TDSA-168-89-2 | NC-50 | 168.28 | 88.9 | 577 | 62.9 |
| TMK TDSM-162-89-2 | 30-133 | 161.9 | 88.9 | 762 | 78.1 |
| TMK TDSAM-168-89-2 | NC-50 | 168.28 | 88.9 | 762 | 86.2 |
| TMK TDS-165-83 | 30-133 | 165.1 | 82.6 | 577 | 63.8 |
| TMK TDSA-168-83 | NC-50 | 168.28 | 82.55 | 577 | 66.7 |
| TMK TDSM-165-83 | 30-133 | 165.1 | 82.6 | 762 | 87.1 |
| TMK TDSAM-168-83 | NC-50 | 168.28 | 82.55 | 762 | 91.2 |
| TMK TDS-165-76 | 30-133 | 165.1 | 76.2 | 577 | 67.2 |
| TMK TDSA-168-76-2 | NC-50 | 168.28 | 76.2 | 577 | 70.0 |
| TMK TDSM-165-76 | 30-133 | 165.1 | 76.2 | 762 | 91.6 |
| TMK TDSAM-168-76-2 | NC-50 | 168.28 | 76.2 | 762 | 95.7 |
| TMK TDS-168-76 | 30-133 | 168.3 | 76.2 | 577 | 69.6 |
| TMK TDSA-168-76-1 | NC-50 | 168.28 | 76.2 | 577 | 69.6 |
| TMK TDSM-168-76 | 30-133 | 168.3 | 76.2 | 762 | 95.3 |
| TMK TDSAM-168-76-1 | NC-50 | 168.28 | 76.2 | 762 | 95.3 |
| TMK TDS-178-102 | 3-147 | 177.8 | 101.6 | 607 | 70.2 |
| TMK TDSA-178-102 | 5 1/2FH | 177.80 | 101.6 | 607 | 70.2 |
| TMK TDSM-178-102 | 3-147 | 177.8 | 101.6 | 750 | 88.8 |
| TMK TDSAM-178-102 | 5 1/2FH | 177.80 | 101.6 | 750 | 88.8 |
| TMK TDS-178-95 | 3-147 | 177.8 | 95.3 | 607 | 74.5 |
| TMK TDSA-178-95-1 | 5 1/2FH | 177.80 | 95.25 | 607 | 72.7 |
| TMK TDSA-178-95-2 | 5 1/2FH | 177.80 | 95.25 | 607 | 74.5 |
| TMK TDSM-178-95 | 3-147 | 177.8 | 95.3 | 750 | 94.0 |
| TMK TDSAM-178-95-1 | 5 1/2FH | 177.80 | 95.25 | 750 | 92.2 |
| TMK TDSAM-178-95-2 | 5 1/2FH | 177.80 | 95.25 | 750 | 94.0 |
| TMK TDS-184-89 | 3-147 | 184.2 | 88.9 | 607 | 85.6 |
| TMK TDSA-184-89-1 | 5 1/2FH | 184.15 | 88.9 | 607 | 84.5 |
| TMK TDSA-184-89-2 | 5 1/2FH | 184.15 | 88.9 | 607 | 85.6 |
| TMK TDSM-184-89 | 3-147 | 184.2 | 88.9 | 750 | 108.2 |
| TMK TDSAM-184-89-1 | 5 1/2FH | 184.15 | 88.9 | 750 | 108.2 |
| TMK TDSAM-184-89-2 | 5 1/2FH | 184.15 | 88.9 | 750 | 108.2 |
| 1 | 2 | 3 | 4 | 5 | 6 |

## Drill pipes and tool joint grade correspondence between GOST 32696, ISO 11961, GOST R 50278 AND GOST 27834

| GOST 32696 | | | | ISO 11961:2018 | | | | GOST R 50278 (for drill pipes bodies) GOST 27834 (for tool joints) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Drill pipes body grade | Yield strength, $\sigma_y$ | | Tensile strength $\sigma_u$, min | Drill pipes body grade | Yield strength, $\sigma_y$ | | Tensile strength $\sigma_u$, min | Drill pipes body grade | Yield strength, $\sigma_y$ | | Tensile strength $\sigma_u$, min |
| | min | max | | | min | max | | | min | max | |
| D | 379 | – | 655 | – | – | – | – | D | 379 | – | 655 |
| E | 517 | 724 | 689 | E | 517 | 724 | 689 | E | 517 | 724 | 689 |
| X | 655 | 862 | 724 | X | 655 | 862 | 724 | L | 655 | 862 | 724 |
| G | 724 | 931 | 793 | G | 724 | 931 | 793 | M | 724 | 930 | 792 |
| S | 931 | 1138 | 1000 | S | 931 | 1138 | 1000 | P | 930 | 1138 | 999 |
| Tool joints | 827 | 1138 | 965 | Tool joints | 827 | 1138 | 965 | Tool joints | 832 | – | 981 |

## Mechanical properties of API* Spec 5DP drill pipes

| Grades | Ultimate tensile strength $\sigma_u$, MPa (ksi), min | Yield strength, $\sigma_y$, MPa, ksi | | Elongation $\delta_5$, %, min |
|---|---|---|---|---|
| | | min | max | |
| E | 689 (100) | 517 (75) | 724 (105) | * |
| X | 724 (105) | 655 (95) | 862 (125) | * |
| G | 793 (115) | 724 (105) | 931 (135) | * |
| S | 1000 (145) | 931 (135) | 1138 (165) | * |

* Calculated by the formula given in API* Spec 5 DP.

## Mechanical properties of tool joints as per GOST 27834-95

| Steel grade | Ultimate tensile strength $\sigma_u$, N/mm$^2$ (kgf/mm$^2$), min | Yield strength $\sigma_y$, N/mm$^2$, (kgf/mm$^2$), min | Elongation $\delta_5$, %, min | Percentage reduction of area, ϕ, %, min | Brinell hardness, HB | Impact strength, J/cm$^2$ (kgf*m/cm$^2$), min | |
|---|---|---|---|---|---|---|---|
| | | | | | | KCV | KCU |
| 40HMFA 35HGMA | 981 (100) | 832 (85) | 13 | 50 | 300-355 | 58.9 (6) | 88.3 (9) |

## Table 2 – Size classes. Main dimensions and weights of TMK UP EXD SG tool joints

| Joint type | Thread type | Tool joint OD, D2, mm | Tool joint ID, D1, mm | Tool joint length, L1, mm | Tong space length of pin, mm [1] | Tong space length of box, mm [1] | Tool joint weight, kg |
|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| TMK UP EXD SG-80-38 | EXD SG 24 | 79.6 | 38.1 | 696 | 251 | 318 | 20.8 |
| TMK UP EXD SG-102-54 | EXD SG 31 | 101.6 | 54.0 | 696 | 251 | 318 | 30.1 |
| TMK UP EXD SG-102-51 | EXD SG 31 | 101.6 | 50.8 | 696 | 251 | 318 | 31.6 |
| TMK UP EXD SG-105-54 | EXD SG 31 | 104.8 | 54.0 | 696 | 251 | 318 | 32.6 |
| TMK UP EXD SG-105-51 | EXD SG 31 | 104.8 | 50.8 | 696 | 251 | 318 | 34.1 |
| TMK UP EXD SG-108-51 | EXD SG 31 | 108.0 | 50.8 | 696 | 251 | 318 | 36.7 |
| TMK UP EXD SG-111-51 | EXD SG 31 | 111.1 | 50.8 | 696 | 251 | 318 | 39.3 |
| TMK UP EXD SG-127-73 | EXD SG 39 | 127.0 | 73.0 | 693 | 248 | 318 | 43.4 |
| TMK UP EXD SG-127-71 | EXD SG 39 | 127.0 | 71.4 | 693 | 248 | 318 | 44.4 |
| TMK UP EXD SG-127-68 | EXD SG 39 | 127.0 | 68.3 | 693 | 248 | 318 | 46.3 |
| TMK UP EXD SG-127-65 | EXD SG 39 | 127.0 | 65.1 | 693 | 248 | 318 | 48.2 |
| TMK UP EXD SG-133-76 | EXD SG 40 | 133.4 | 76.2 | 677 | 227 | 308 | 47.6 |
| TMK UP EXD SG-133-71 | EXD SG 40 | 133.4 | 71.4 | 677 | 227 | 308 | 50.6 |
| TMK UP EXD SG-133-68 | EXD SG 40 | 133.4 | 68.3 | 677 | 227 | 308 | 52.4 |
| TMK UP EXD SG-133-65 | EXD SG 40 | 133.4 | 65.1 | 677 | 227 | 308 | 54.2 |
| TMK UP EXD SG-140-68 | EXD SG 40 | 139.7 | 68.3 | 677 | 227 | 308 | 58.9 |
| TMK UP EXD SG-140-65 | EXD SG 40 | 139.7 | 65.1 | 677 | 227 | 308 | 60.7 |
| TMK UP EXD SG-162-95 | EXD SG 50 | 161.9 | 95.3 | 677 | 227 | 308 | 65.8 |
| TMK UP EXD SG-162-92 | EXD SG 50 | 161.9 | 92.1 | 677 | 227 | 308 | 69.0 |
| TMK UP EXD SG-162-89 | EXD SG 50 | 161.9 | 88.9 | 677 | 227 | 308 | 71.4 |
| TMK UP EXD SG-165-95 | EXD SG 50 | 165.1 | 95.3 | 677 | 227 | 308 | 70.3 |
| TMK UP EXD SG-165-92 | EXD SG 50 | 165.1 | 92.1 | 677 | 227 | 308 | 72.8 |
| TMK UP EXD SG-165-89 | EXD SG 50 | 165.1 | 88.9 | 677 | 227 | 308 | 75.2 |
| TMK UP EXD SG-168-95 | EXD SG 50 | 168.3 | 95.3 | 677 | 227 | 308 | 74.2 |
| TMK UP EXD SG-168-92 | EXD SG 50 | 168.3 | 92.1 | 677 | 227 | 308 | 76.7 |
| TMK UP EXD SG-168-89 | EXD SG 50 | 168.3 | 88.9 | 677 | 227 | 308 | 79.1 |
| TMK UP EXD SG-178-108 | EXD SG 57 | 177.8 | 108.0 | 710 | 246 | 322 | 82.1 |
| TMK UP EXD SG-178-102 | EXD SG 57 | 177.8 | 101.6 | 710 | 246 | 322 | 88.0 |
| TMK UP EXD SG-178-95 | EXD SG 57 | 177.8 | 95.3 | 710 | 246 | 322 | 93.5 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |

1) Joints with other tong space lengths can be supplied at the customer's request.

# OCTG MADE OF SPECIAL STEELS AND ALLOYS

TMK Group has developed a wide range of tubing and casing with special properties for extremely low-temperature and corrosive environments

MANUFACTURERS

VTZ, SinTZ, TAGMET, CHTPZ, PNTZ

**FEATURES**

**Low-temperature pipes**

Pipes designed for Siberian and Far North. The pipe metal has high ductility and impact strength at negative temperatures. Charpy impact test at -60°C with determination of ductile fracture percentage in the test piece is used to evaluate low-temperature performance of pipes metal.

**Hydrogen sulfide-resistant pipes (S, SS)**

Pipes intended for fields with hydrogen sulfide in produced fluids. The pipe metal has high sulfide stress cracking resistance, which is confirmed by tests in accordance with NACE TM0177. The threshold stress intensity factor for pipes metal testing is selected depending on $H_2S$ partial pressure. S or SS is added to pipes grade designations of hydrogen sulfide resistant pipes.

**Carbon dioxide resistant pipes (13CR, 13CRS, 13CRL)**

Pipes intended for fields with carbon dioxide in produced fluids. Pipe metal is resistant to $CO_2$ corrosion. Pipe steel contains 13% of chromium to ensure corrosion resistance. Two levels of resistance are available depending on downhole conditions (pressure, temperature, partial pressures of $CO_2$ and $H_2S$): for standard pressures and temperatures and fluids containing $CO_2$; for high pressures and temperatures and fluids containing $CO_2$ and small amounts of $H_2S$.

## Standards

| Standards | Pipes size | | | | Grade | Connection |
|---|---|---|---|---|---|---|
| | Outside diameter | | Wall thickness, mm (ppf) | Length, m | | |
| | inches | mm | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| API* Specification 5CRA / ISO 13680<br>Specification for Corrosion-resistant Alloy Seamless Tubes for Use as Casing, Tubing, and Coupling Stock | 3 1/2 | 88.9 | 6.45 (9.2) | 8.0-12.0 | UNS N08028 (110 ksi); UNS N08535 (110 ksi) | TMK UP PF |
| | 4 1/2 | 114.3 | 6.88 (12.6) | | | |
| | 4 1/2 | 114.3 | 7.37 (13.5) | | | |
| | 5 | 127 | 7.52 (15) | | | |
| | 6 5/8 | 168.28 | 10.59 (28) | | | |
| | 7 | 177.8 | 9.19 (26) | | | |
| | 7 | 177.8 | 10.36 (29) | | | |
| GOST 31446-2017<br>Steel casing and tubing for petroleum and natural gas industries. General specifications (Effective date: July 01, 2018) | 73 | 73.02 | 5.51 | | L80 type 1; L80 type 13Cr; C90; T95; C110 | Plain-end; NKT; NKTV; NKM; TMK FMT; TMK UP PF |
| | | 73.02 | 7.01 | | | |
| | 89 | 88.90 | 6.45 | | | PLAIN-END; NKT; NKTV; NKM; TMK FMT; TMK UP PF; TMK UP CENTUM ET |
| | | 88.90 | 7.34 | | | |
| | 114-273 | 114.3-273.1 | 7.37-13.06 | | | TMK UP FMC; TMK UP PF; TMK UP PF ET; TMK UP Centum; TMK UP Centum ET |
| TU 14-157-119-2015<br>Hydrogen resistant, hydrogen sulfide resistant and low-temperature seamless steel tubing and couplings | | 114.3 | 6.88 | 7.62-10.36 | L80 type 1; C90 type 1 | TMK UP PF |
| | | 139.7 | 7.72 | 7.62-10.36 | | |
| TU 14-3R-114-2011<br>Seamless casing and couplings made of martensitic 13Cr and super 13Cr steels with TMK UP FMC and TMK UP GF gas-tight threaded joints | | 114.3 | 6.35; 8.56 | 9.5-12.2 | L80 type 13CrS; C95 type 13CrS; P110 type 13CrS | TMK UP FMC; TMK UP GF; TMK UP PF |
| | | 168.28 | 8.94; 12.06 | 9.5-13.0 | L80 type 13Cr | TMK UP FMC; TMK UP GF; TMK UP PF |
| | | 177.8 | 9.19; 10.36 | | | |
| TU 14-3R-129-2015<br>Seamless casing and couplings made of martensitic 13Cr and super 13Cr steels with gas-tight threaded joints | | 114.3 | 6.35; 8.56 | 9.5-12.2 | L80 type 13Cr; L80 type l3CrL; R95 type 13Cr; R95 type 13CrL; P110 type 13CrL | TMK UP FMC; TMK UP PF |
| | | 168 | 8.94 | | L80 type 13CrL; P110 type 13Cr | TMK UP PF |
| | | 177.8 | 9.19; 10.36 | 9.5-13.0 | L80 type 13Cr; P110 type 13Cr R95 type 13CrL | TMK UP FMC; TMK UP PF |
| | | 244.48; 244.5 | 11.05; 11.99 | 9.5-13.0 | | |
| | | 273.05; 273.1 | 11.43 | 9.5-13.0 | | |
| TU 14-3R-138-2014<br>Hydrogen sulfide resistant seamless steel tubing and couplings of pipes grade C90SS | | 73.02 | 5.51 | | | |
| | | 88.9 | 9.52 | 9.5-12.2 | C90SS | TMK UP PF |
| | | 114.3 | 10.92 | | | |
| TU 14-3R-139-2014<br>Seamless tubing and couplings made of a corrosion-resistant alloy with TMK UP PF gas-tight threaded connections | | 88.9 | 6.45 | 8.0-12.0 | 110CrNi | TMK UP PF |
| | | 114.3 | 6.88 | | | |
| TU 14-3R-168-2019<br>Seamless casing and couplings made of a corrosion-resistant alloy with gas-tight threaded connections | | 168.28 | 10.59 | 8.0-12.0 | 110CrNi | TMK UP PF |
| TS 157-240-2016<br>Seamless tubing and couplings made of the TMK-C corrosion-resistant alloy of pipes grade 110 with TMK UP PF gas-tight threaded connections | | 114.3 | 7.37 | 8.0-12.0 | TMK-C | TMK UP PF |
| | | 127 | 7.52 | | | |
| | | 177.8 | 9.19 | | | |
| | | 177.8 | 10.36 | | | |
| TS 62T-70-22<br>Seamless casing pipes and couplings made of corrosion-resistant alloy with TMK UP PF gas-tight threaded connections | | 114.3-177.8 | 7.37-10.36 | 8.0-12.0 | | TMK UP PF |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

# OIL AND GAS LINE PIPES

Pipes for oil and gas pipelines, including sweet and sour service, for gas-lift systems, and field development, including pipes for low temperature application

MANUFACTURERS

VTZ, STZ, SinTZ, TAGMET, CHTPZ, PNTZ

**FEATURES**

Oil and gas line pipes are made of TMK's own metal melted in an EAF, treated in ladle furnace and vacuum degassing station and cast in a continuous casting machine. This method produces pure steel complying with requirements for harmful impurities (sulfur and phosphorus) ensuring high strength, ductility and corrosion performance of pipes at low temperatures and in corrosive environments.

Wall thickness is inspected by full length ultrasonic testing, with automated nondestructive electromagnetic and ultrasonic testing for inner and outer surface defects.

At customer's request, oil and gas line pipes can be produced for subsequent internal and/or external coating.

Tensile, flattening, hydrostatic and impact testing is conducted (if necessary) in accordance with the applicable standards.

At customer's request, the outer surface of the pipe is coated with paint designed for protection against atmospheric corrosion during transportation and storage.

Pipes are supplied in the bundles with lifting slings.

At customer's request, pipes can be equipped with protective end caps.

## Standards

| Standards | Pipes dimensions | | Steel grade | Pipes grade |
|---|---|---|---|---|
| | Outside diameter, mm | Wall thickness, mm | | |
| 1 | 2 | 3 | 4 | 5 |
| API* Spec 5L<br>Specification for line pipes | 33.4-406.4<br>168.3-426 | 3.4-28.6<br>7.0-34.8 | L175; L175P; L210–L555 | A25; A25P; A; B; X42–X80 |
| CSA Z 245.1-07<br>Steel pipes | 21.3-168.3 | 2.77-10.97 | 20; 12GB; 20F; 14G1F; 14G2F; 08HMFChA | Gr.241; Gr.290; Gr.359; Gr. 386; Gr. 414; Gr. 448. Categories I; II and III for ordinary and corrosive environments |
| Offshore standard DNV-OS-F101. Submarine pipeline systems | 219-426 | 7.0-32.0 | | 250–450 F; D; S; P; U |
| GOST 30564-98<br>Seamless hot-worked carbon and alloy steel pipes and tubes with special properties | 38.0-426 | 3.5-32 | 10; 20; 09G2S and other steel grades; 20; 10G2A; 15HM; 30HMA | |
| 1 | 2 | 3 | 4 | 5 |

## Pipes as per API* Spec 5L

| Nominal size | Outside diameter | | Wall thickness | | Weight per unit length | | Schedule |
|---|---|---|---|---|---|---|---|
| | mm | inch | mm | inch | kg/m | lb/ft | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 1 | 33.4 | 1.315 | 3.4 | 0.133 | 2.50 | 1.68 | STD |
| 1 | 33.4 | 1.315 | 4.5 | 0.179 | 3.24 | 2.17 | XS |
| 1 1/4 | 42.2 | 1.660 | 3.6 | 0.140 | 3.39 | 2.27 | STD |
| 1 1/4 | 42.2 | 1.660 | 4.9 | 0.191 | 4.47 | 3.00 | XS |
| 1 1/2 | 48.3 | 1.900 | 3.7 | 0.145 | 4.05 | 2.72 | STD |
| 11/2 | 48.3 | 1.900 | 5.1 | 0.200 | 5.40 | 3.63 | XS |
| 2 3/8 | 60.3 | 2.375 | 2.1 | 0.083 | 3.02 | 2.03 | STD |
| 2 3/8 | 60.3 | 2.375 | 2.8 | 0.109 | 3.93 | 2.64 | STD |
| 2 3/8 | 60.3 | 2.375 | 3.2 | 0.125 | 4.47 | 3.00 | STD |
| 2 3/8 | 60.3 | 2.375 | 3.6 | 0.141 | 5.00 | 3.36 | STD |
| 2 3/8 | 60.3 | 2.375 | 3.9 | 0.154 | 5.43 | 3.65 | STD |
| 2 3/8 | 60.3 | 2.375 | 4.4 | 0.172 | 6.03 | 4.05 | STD |
| 2 3/8 | 60.3 | 2.375 | 4.8 | 0.188 | 6.54 | 4.39 | STD |
| 2 3/8 | 60.3 | 2.375 | 5.5 | 0.218 | 7.48 | 5.02 | STD |
| 2 3/8 | 60.3 | 2.375 | 6.4 | 0.250 | 8.45 | 5.76 | STD |
| 2 3/8 | 60.3 | 2.375 | 7.1 | 0.281 | 9.36 | 6.28 | STD |
| 2 7/8 | 73.0 | 2.875 | 3.6 | 0.141 | 6.13 | 4.12 | STD |
| 2 7/8 | 73.0 | 2.875 | 4.0 | 0.156 | 6.75 | 4.53 | STD |
| 2 7/8 | 73.0 | 2.875 | 4.4 | 0.172 | 7.40 | 4.97 | STD |
| 2 7/8 | 73.0 | 2.875 | 4.8 | 0.188 | 8.04 | 5.4 | STD |
| 2 7/8 | 73.0 | 2.875 | 5.2 | 0.203 | 8.62 | 5.79 | STD |
| 2 7/8 | 73.0 | 2.875 | 5.5 | 0.216 | 9.13 | 6.13 | STD |
| 2 7/8 | 73.0 | 2.875 | 6.4 | 0.250 | 10.44 | 7.01 | STD |
| 2 7/8 | 73.0 | 2.875 | 7.0 | 0.276 | 11.41 | 7.66 | STD |
| 3 1/2 | 88.9 | 3.500 | 4.0 | 0.156 | 8.29 | 5.57 | STD |
| 3 1/2 | 88.9 | 3.500 | 4.4 | 0.172 | 9.10 | 6.11 | STD |
| 3 1/2 | 88.9 | 3.500 | 4.8 | 0.188 | 9.90 | 6.65 | STD |
| 3 1/2 | 88.9 | 3.500 | 5.5 | 0.216 | 11.29 | 7.58 | STD |
| 3 1/2 | 88.9 | 3.500 | 6.4 | 0.250 | 12.93 | 8.68 | STD |
| 3 1/2 | 88.9 | 3.500 | 7.1 | 0.281 | 14.38 | 9.66 | STD |
| 3 1/2 | 88.9 | 3.500 | 7.6 | 0.300 | 15.26 | 10.25 | STD |
| 4 | 101.6 | 4.000 | 5.7 | 0.226 | 13.57 | 9.11 | STD |
| 4 | 101.6 | 4.000 | 6.4 | 0.250 | 14.91 | 10.01 | STD |
| 4 | 101.6 | 4.000 | 7.1 | 0.281 | 16.62 | 11.16 | STD |
| 4 | 101.6 | 4.000 | 8.1 | 0.318 | 18.61 | 12.50 | STD |
| 41/2 | 114.3 | 4.500 | 5.2 | 0.203 | 13.88 | 9.32 | STD |
| 41/2 | 114.3 | 4.500 | 5.6 | 0.219 | 14.91 | 10.01 | STD |
| 41/2 | 114.3 | 4.500 | 6.0 | 0.237 | 16.07 | 10.79 | STD |
| 4 1/2 | 114.3 | 4.500 | 6.4 | 0.250 | 16.90 | 11.35 | STD |
| 41/2 | 114.3 | 4.500 | 7.1 | 0.281 | 18.85 | 12.66 | STD |
| 41/2 | 114.3 | 4.500 | 7.9 | 0.312 | 20.79 | 13.96 | STD |
| 41/2 | 114.3 | 4.500 | 8.6 | 0.337 | 22.31 | 14.98 | STD |
| 4 1/2 | 114.3 | 4.500 | 11.1 | 0.438 | 28.30 | 19.00 | STD |
| 5 9/16 | 141.3 | 5.563 | 5.6 | 0.219 | 18.61 | 12.50 | STD |
| 5 9/16 | 141.3 | 5.563 | 6.6 | 0.258 | 21.77 | 14.62 | STD |
| 5 9/16 | 141.3 | 5.563 | 7.1 | 0.281 | 23.61 | 15.85 | STD |
| 5 9/16 | 141.3 | 5.563 | 7.9 | 0.312 | 26.06 | 17.50 | STD |
| 5 9/16 | 141.3 | 5.563 | 8.7 | 0.344 | 28.55 | 19.17 | STD |
| 5 9/16 | 141.3 | 5.563 | 9.5 | 0.375 | 30.95 | 20.78 | STD |
| 5 9/16 | 141.3 | 5.563 | 12.7 | 0.500 | 40.28 | 27.04 | STD |
| 6 5/8 | 168.3 | 6.625 | 6.4 | 0.250 | 25.35 | 17.02 | – |
| 6 5/8 | 168.3 | 6.625 | 7.1 | 0.280 | 28.22 | 18.97 | STD |
| 6 5/8 | 168.3 | 6.625 | 7.9 | 0.312 | 31.25 | 21.04 | |
| 6 5/8 | 168.3 | 6.625 | 8.7 | 0.344 | 34.24 | 23.08 | |
| 6 5/8 | 168.3 | 6.625 | 9.5 | 0.375 | 37.20 | 25.03 | |
| 6 5/8 | 168.3 | 6.625 | 11.0 | 0.432 | 42.67 | 28.57 | XS |
| 6 5/8 | 168.3 | 6.625 | 12.7 | 0.500 | 48.73 | 32.71 | |
| 6 5/8 | 168.3 | 6.625 | 14.3 | 0.562 | 54.31 | 36.39 | |
| 6 5/8 | 168.3 | 6.625 | 15.9 | 0.625 | 59.76 | 40.05 | |
| 6 5/8 | 168.3 | 6.625 | 18.3 | 0.750 | 67.69 | 45.35 | |
| 6 5/8 | 168.3 | 6.625 | 19.1 | 0.864 | 70.27 | 47.06 | XXS |
| 6 5/8 | 168.3 | 6.625 | 22.2 | 0.875 | 79.98 | 53.73 | |
| 8 5/8 | 219.1 | 8.625 | 7.0 | 0.277 | 36.61 | 24.70 | |
| 8 5/8 | 219.1 | 8.625 | 7.9 | 0.312 | 41.14 | 27.70 | |
| 8 5/8 | 219.1 | 8.625 | 8.18 | 0.322 | 42.55 | 28.58 | STD |
| 8 5/8 | 219.1 | 8.625 | 8.74 | 0.344 | 45.34 | 30.45 | |
| 8 5/8 | 219.1 | 8.625 | 9.53 | 0.375 | 49.25 | 33.07 | |
| 8 5/8 | 219.1 | 8.625 | 11.13 | 0.438 | 57.08 | 38.33 | |
| 8 5/8 | 219.1 | 8.625 | 12.70 | 0.500 | 64.64 | 43.43 | XS |
| 8 5/8 | 219.1 | 8.625 | 14.27 | 0.562 | 72.08 | 48.44 | |
| 8 5/8 | 219.1 | 8.625 | 15.88 | 0.625 | 79.59 | 53.45 | |
| 8 5/8 | 219.1 | 8.625 | 18.26 | 0.719 | 90.44 | 60.77 | |
| 8 5/8 | 219.1 | 8.625 | 19.05 | 0.750 | 93.98 | 63.14 | |
| 8 5/8 | 219.1 | 8.625 | 20.62 | 0.812 | 100.93 | 67.82 | |
| 8 5/8 | 219.1 | 8.625 | 22.23 | 0.875 | 107.93 | 72.49 | XXS |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |

## Pipes as per API* Spec 5L (continued)

| Nominal size | Outside diameter | | Wall thickness | | Weight per unit length | | Schedule |
|---|---|---|---|---|---|---|---|
| | mm | inch | mm | inch | kg/m | lb/ft | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 8 5/8 | 219.1 | 8.625 | 25.40 | 1.000 | 121.33 | 81.51 | |
| 10 3/4 | 273.0 | 10.750 | 7.80 | 0.307 | 51.01 | 34.27 | |
| 10 3/4 | 273.0 | 10.750 | 8.74 | 0.344 | 56.96 | 38.27 | |
| 10 3/4 | 273.0 | 10.750 | 9.27 | 0.365 | 60.29 | 40.52 | STD |
| 10 3/4 | 273.0 | 10.750 | 11.13 | 0.438 | 71.88 | 48.28 | |
| 10 3/4 | 273.0 | 10.750 | 12.70 | 0.500 | 81.53 | 54.79 | XS |
| 10 3/4 | 273.0 | 10.750 | 14.27 | 0.562 | 91.05 | 61.21 | |
| 10 3/4 | 273.0 | 10.750 | 15.88 | 0.625 | 100.69 | 67.65 | |
| 10 3/4 | 273.0 | 10.750 | 18.26 | 0.719 | 114.71 | 77.10 | |
| 10 3/4 | 273.0 | 10.750 | 20.62 | 0.812 | 128.34 | 86.26 | |
| 10 3/4 | 273.0 | 10.750 | 22.23 | 0.875 | 137.48 | 92.37 | |
| 10 3/4 | 273.0 | 10.750 | 23.83 | 0.938 | 146.43 | 98.39 | |
| 10 3/4 | 273.0 | 10.750 | 25.40 | 1.000 | 155.10 | 104.23 | XXS |
| 12 3/4 | 323.8 | 12.750 | 8.74 | 0.344 | 67.31 | 45.62 | |
| 12 3/4 | 323.8 | 12.750 | 9.53 | 0.375 | 73.86 | 49.61 | STD |
| 12 3/4 | 323.8 | 12.750 | 10.31 | 0.406 | 79.71 | 53.57 | |
| 12 3/4 | 323.8 | 12.750 | 11.13 | 0.438 | 85.82 | 57.65 | |
| 12 3/4 | 323.8 | 12.750 | 12.70 | 0.500 | 97.44 | 65.48 | XS |
| 12 3/4 | 323.8 | 12.750 | 14.27 | 0.562 | 108.93 | 73.22 | |
| 12 3/4 | 323.8 | 12.750 | 15.88 | 0.625 | 120.53 | 81.01 | |
| 12 3/4 | 323.8 | 12.750 | 17.48 | 0.688 | 132.05 | 88.71 | |
| 12 3/4 | 323.8 | 12.750 | 19.05 | 0.750 | 143.17 | 96.21 | |
| 12 3/4 | 323.8 | 12.750 | 20.62 | 0.812 | 154.17 | 103.63 | |
| 12 3/4 | 323.8 | 12.750 | 22.23 | 0.875 | 165.33 | 111.08 | |
| 12 3/4 | 323.8 | 12.750 | 23.83 | 0.938 | 176.29 | 118.44 | |
| 12 3/4 | 323.8 | 12.750 | 25.40 | 1.000 | 186.92 | 125.61 | XXS |
| 12 3/4 | 323.8 | 12.750 | 26.97 | 1.062 | 197.43 | 132.69 | |
| 14 | 355.6 | 14.000 | 9.53 | 0.375 | 81.33 | 54.62 | STD |
| 14 | 355.6 | 14.000 | 10.31 | 0.406 | 87.79 | 59.00 | |
| 14 | 355.6 | 14.000 | 11.13 | 0.438 | 94.55 | 63.50 | |
| 14 | 355.6 | 14.000 | 11.91 | 0.469 | 100.95 | 67.84 | |
| 14 | 355.6 | 14.000 | 12.70 | 0.500 | 107.40 | 72.16 | XS |
| 14 | 355.6 | 14.000 | 14.27 | 0.562 | 120.12 | 80.73 | |
| 14 | 355.6 | 14.000 | 15.88 | 0.625 | 133.04 | 89.36 | |
| 14 | 355.6 | 14.000 | 17.48 | 0.688 | 145.76 | 97.91 | |
| 14 | 355.6 | 14.000 | 19.05 | 0.750 | 158.11 | 106.23 | |
| 14 | 355.6 | 14.000 | 20.62 | 0.812 | 170.34 | 114.48 | |
| 14 | 355.6 | 14.000 | 22.23 | 0.875 | 182.76 | 122.77 | |
| 14 | 355.6 | 14.000 | 23.83 | 0.938 | 194.98 | 130.98 | |
| 14 | 355.6 | 14.000 | 25.40 | 1.000 | 206.84 | 138.97 | |
| 14 | 355.6 | 14.000 | 26.97 | 1.062 | 218.58 | 146.88 | |
| 16 | 406.4 | 16.000 | 11.91 | 0.469 | 115.87 | 77.87 | |
| 16 | 406.4 | 16.000 | 12.70 | 0.500 | 123.31 | 82.85 | XS |
| 16 | 406.4 | 16.000 | 14.27 | 0.562 | 138.00 | 92.75 | |
| 16 | 406.4 | 16.000 | 15.88 | 0.625 | 152.94 | 102.72 | |
| 16 | 406.4 | 16.000 | 17.48 | 0.688 | 167.66 | 112.62 | |
| 16 | 406.4 | 16.000 | 19.05 | 0.750 | 181.98 | 122.27 | |
| 16 | 406.4 | 16.000 | 20.62 | 0.812 | 196.18 | 131.84 | |
| 16 | 406.4 | 16.000 | 22.23 | 0.875 | 210.61 | 141.48 | |
| 16 | 406.4 | 16.000 | 23.83 | 0.938 | 224.83 | 151.03 | |
| 16 | 406.4 | 16.000 | 25.40 | 1.000 | 238.66 | 160.35 | |
| 16 | 406.4 | 16.000 | 26.97 | 1.062 | 252.37 | 169.59 | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |

## Tensile requirements for PSL 1 as per API* Spec 5L

| Pipes grade | Seamless or welded pipes body | | |
|---|---|---|---|
| | Yield strength $R_{t0.5}$, MPa (psi), minimum | Tensile strength $R_m$, MPa (psi), minimum | Elongation $A_f$, %, minimum |
| L175 or A25 | 175 (25,400) | 310 (45,000) | a |
| L175P or A25P | 175 (25,400) | 310 (45,000) | a |
| L210 or A | 210 (30,500) | 335 (48,600) | a |
| L245 or B | 245 (35,500) | 415 (60,200) | a |
| L290R or X42R; L290 or X42 | 290 (42,100) | 415 (60,200) | a |
| L320 or X46 | 320 (46,400) | 435 (63,100) | a |
| L360 or X52 | 360 (52,200) | 460 (66,700) | a |
| L390 or X56 | 390 (56,600) | 490 (71,100) | a |
| L415 or X60 | 415 (60,200) | 520 (75,400) | a |
| L450 or X65 | 450 (65,300) | 535 (77,600) | a |
| L485 or X70 | 485 (70,300) | 570 (82,700) | a |

## Tensile requirements for PSL 2 as per API* Spec 5L

| Pipes grade | Seamless and welded pipes body | | | | | |
|---|---|---|---|---|---|---|
| | Yield strength $R_{t0.5}$[b], MPa (psi) | | Tensile strength $R_m$, MPa (psi) | | $R_{t0.5}$[b]/$R_m$ ratio maximum | Elongation, $A_f$, %, minimum |
| | minimum | maximum | minimum | maximum | | |
| L245R or BR<br>L245N or BN | 245<br>(35,500) | 450<br>(65,300) | 415<br>(60,200) | 760<br>(110,200) | 0.93 | a |
| L290R or X42R<br>L290N or X42N | 290<br>(42,100) | 495<br>(71,800) | 415<br>(60,200) | 760<br>(110,200) | 0.93 | a |
| L320N or X46N | 320 (46,400) | 525 (76,100) | 435 (63,100) | 760 (110,200) | 0.93 | a |
| L360N or X52N<br>L360Q or X52Q | 360<br>(52,200) | 530<br>(76,900) | 460<br>(66,700) | 760<br>(110,200) | 0.93 | a |
| L390Q or X56Q | 390 (56,600) | 545 (79,000) | 490 (71,100) | 760 (110,200) | 0.93 | a |
| L415Q or X60Q | 415 (60,200) | 565 (81,900) | 520 (75,400) | 760 (110,200) | 0.93 | a |
| L450Q or X65Q | 450 (65,300) | 600 (87,000) | 535 (77,600) | 760 (110,200) | 0.93 | a |
| L485Q or X70Q | 485 (70,300) | 635 (92,100) | 570 (82,700) | 760 (110,200) | 0.93 | a |
| L555Q or X80Q | 555 (80,500) | 705 (102,300) | 625 (90,600) | 825 (119,700) | 0.93 | a |

Note: determined by a formula given in API* Spec 5L.

## Tensile requirements for PSL 2 for sour service as per API* Spec 5L

| Pipes grade | Seamless and welded pipes body | | | | | |
|---|---|---|---|---|---|---|
| | Yield strength $R_{t0.5}$[b], MPa (psi) | | Tensile strength $R_m$, MPa (psi) | | $R_{t0.5}$[b]/$R_m$ ratio | Elongation, $A_f$, %, |
| | max | min | max | min | max | min |
| L245NS or BNS | 245 (35,500) | 450 (65,300) | 415 (60,200) | 760 (110,200) | 0.93 | a |
| L290NS or X42NS | 290 (42,100) | 495 (71,800) | 415 (60,200) | 760 (110,200) | 0.93 | a |
| L360NS or X52NS<br>L360QS or X52QS | 360<br>(52,200) | 530<br>(76,900) | 460<br>(66,700) | 760<br>(110,200) | 0.93 | a |
| L390QS or X56QS | 390 (56,600) | 545 (79,000) | 490 (71,100) | 760 (110,200) | 0.93 | a |
| L415QS or X60QS | 415 (60,200) | 565 (81,900) | 520 (75,400) | 760 (110,200) | 0.93 | a |
| L450QS or X65QS | 450 (65,300) | 600 (87,000) | 535 (77,600) | 760 (110,200) | 0.93 | a |

## Tensile requirements for PSL 2 for offshore service as per API* Spec 5L

| Pipes grade | Seamless and welded pipes body | | | | | |
|---|---|---|---|---|---|---|
| | Yield strength $R_{t0.5}$[b], MPa (psi) | | Tensile strength $R_m$, MPa (psi) | | $R_{t0.5}$[b]/$R_m$ ratio | Elongation, $A_f$, %, |
| | max | min | max | min | max | min |
| L245NO or BNO | 245 (35,500) | 450[e] (65,300)[e] | 415 (60,200) | 760 (110,200) | 0.93 | a |
| L290NO or X42NO | 290 (42,100) | 495 (71,800) | 415 (60,200) | 760 (110,200) | 0.93 | a |
| L360NO or X52NO | 360 (52,200) | 525 (76,000) | 460 (66,700) | 760 (110,200) | 0.93 | a |
| L390QO or X56QO | 390 (56,600) | 540 (78,300) | 490 (71,100) | 760 (110,200) | 0.93 | a |
| L415QO or X60QO | 415 (60,200) | 565 (81,900) | 520 (75,400) | 760 (110,200) | 0.93 | a |
| L450QO or X65QO | 450 (65,300) | 570 (82,700) | 535 (77,600) | 760 (110,200) | 0.93 | a |

Note: determined by a formula given in API* Spec 5L.

## Requirements for the chemical composition of heats and products in weight percents for PSL 1 as per API* Spec 5L

| Steel grade (name of steel) | Mass fraction according to heat and product analysis[a], % | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | C maximum[b] | Mn maximum[b] | P | | S maximum | V maximum | Nb maximum | Ti maximum |
| | | | minimum | maximum | | | | |
| L175 or A25 | 0.21 | 0.60 | – | 0.030 | 0.030 | – | – | – |
| L175P or A25P | 0.21 | 0.60 | 0.045 | 0.080 | 0.030 | – | – | – |
| L210 or A | 0.22 | 0.90 | – | 0.030 | 0.030 | – | – | – |
| L245 or B | 0.28 | 1.20 | – | 0.030 | 0.030 | c, d | c, d | d |
| L290 or X42 | 0.28 | 1.30 | – | 0.030 | 0.030 | d | d | d |
| L320 or X46 | 0.28 | 1.40 | – | 0.030 | 0.030 | d | d | d |
| L360 or X52 | 0.28 | 1.40 | – | 0.030 | 0.030 | d | d | d |
| L390 or X56 | 0.28 | 1.40 | – | 0.030 | 0.030 | d | d | d |
| L415 or X60 | 0.28[e] | 1.40[e] | – | 0.030 | 0.030 | f | f | f |
| L450 or X65 | 0.28[e] | 1.40[e] | – | 0.030 | 0.030 | f | f | f |
| L485 or X70 | 0.28[e] | 1.40[e] | – | 0.030 | 0.030 | f | f | f |

a – Maximum 0.50% for copper, maximum 0.50% for nickel, maximum 0.50% for chromium, and maximum 0.15% for molybdenum. For steel grades or pipes grades up to and including L360/X52, Cu, Cr and Ni should not be added intentionally.
b – For each 0.01% of carbon content reduction below its specified maximum content, manganese content can be increased by 0.05% above its specified maximum content to a maximum of 1.65% for grades ≥ L245 or B, but ≤ L360 or X52; a maximum of 1.75% for grades > L360 or X52, but < L485 or X70; and a maximum of 2.00% for L485 or X70.
c – Unless otherwise agreed, total niobium and vanadium content should be ≤ 0.06%.
d – Total content of niobium, vanadium and titanium should be ≤ 0.15%.
e – Unless otherwise agreed.
c – Unless otherwise agreed, total niobium, vanadium and titanium content should be ≤ 0.15%.

## Requirements for the chemical composition of heats and products in weight percents for PSL 2 as per API* Spec 5L

| Steel grade (name of steel) | Mass fraction according to heat and product analysis, %, maximum | | | | | | | | | Carbon equivalent[a], %, maximum | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | C[b] | Si | Mn[b] | P | S | V | Nb | Ti | Other | $CE_{IIW}$ | $CE_{Pcm}$ |
| L245R or BR | 0.24 | 0.40 | 1.20 | 0.025 | 0.015 | c | c | 0.04 | e | 0.43 | 0.25 |
| L290R or X42R | 0.24 | 0.40 | 1.20 | 0.025 | 0.015 | 0.06 | 0.05 | 0.04 | e | 0.43 | 0.25 |
| L245N or BN | 0.24 | 0.40 | 1.20 | 0.025 | 0.015 | c | c | 0.04 | e | 0.43 | 0.25 |
| L290N or X42N | 0.24 | 0.40 | 1.20 | 0.025 | 0.015 | 0.06 | 0.05 | 0.04 | e | 0.43 | 0.25 |
| L320N or X46N | 0.24 | 0.40 | 1.40 | 0.025 | 0.015 | 0.07 | 0.05 | 0.04 | d, e | 0.43 | 0.25 |
| L360N or X52N | 0.24 | 0.45 | 1.40 | 0.025 | 0.015 | 0.10 | 0.05 | 0.04 | d, e | 0.43 | 0.25 |
| L360Q or X52Q | 0.18 | 0.45 | 1.50 | 0.025 | 0.05 | 0.05 | 0.05 | 0.04 | e | 0.43 | 0.25 |
| L390Q or X56Q | 0.18 | 0.45 | 1.50 | 0.025 | 0.015 | 0.07 | 0.05 | 0.04 | d, e | 0.43 | 0.25 |
| L415Q or X60Q | 0.18[f] | 0.45[f] | 1.70[f] | 0.025 | 0.015 | g | g | g | h | 0.43 | 0.25 |
| L450Q or X65Q | 0.18[f] | 0.45[f] | 1.70[f] | 0.025 | 0.015 | g | g | g | h | 0.43 | 0.25 |
| L485Q or X70Q | 0.18[f] | 0.45[f] | 1.80[f] | 0.025 | 0.015 | g | g | g | h | 0.43 | 0.25 |
| L555Q or X80Q | 0.18[f] | 0.45[f] | 1.90[f] | 0.025 | 0.015 | g | g | g | i. j | As agreed | |

a – According to the product analysis results. Maximum carbon equivalent for seamless pipes with t > 20,0 mm (0,787 in.) is subject to agreement. The CEIIW limit value applies if C > 0,12%. The CEPcm limit value applies if the mass fraction of C ≤ 0,12%.
b – For each 0,01% of carbon content reduction below its specified maximum content, manganese content can be increased by 0,05% above its specified maximum content to a maximum of 1,65% for grades ≥ L245 or B, but ≤ L360 or X52; a maximum of 1,75% for grades > L360 or X52, but < L485 or X70; a maximum of 2,00% for grades ≥ L485 or X70, but ≤ L555 or X80; and a maximum of 2,20% for grades > L555 or X80.
c – Unless otherwise agreed, total niobium and vanadium content should be ≤ 0,06%.
d – Total content of niobium, vanadium and titanium should be ≤ 0,15%.
e – Unless otherwise agreed, maximum 0,50% for copper, maximum 0,30% for nickel, maximum 0,30% for chromium and maximum 0,15% for molybdenum.
f – Unless otherwise agreed.
g – Unless otherwise agreed, total niobium, vanadium and titanium content should be ≤ 0,15%.
h – Unless otherwise agreed, maximum 0,50% for copper, maximum 0,50% for nickel, maximum 0,50% for chromium, and maximum 0,50% for molybdenum.
i – Unless otherwise agreed, maximum 0,50% for copper, maximum 1,00% for nickel, maximum 0,50% for chromium, and maximum 0,50% for molybdenum.
j – Maximum 0,004 0% for boron.

## Requirements for the chemical composition of heats and products in weight percents for PSL 2 sour service pipes, as per API* Spec 5L

| Steel grade | Mass fraction according to heat and product analysis, %, maximum | | | | | | | | | Carbon equivalent[a]. %. maximum | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | C[b] | Si | Mn[b] | P | S | V | Nb | Ti | Other[c. d] | $CE_{IIW}$ | $CE_{Pcm}$ |
| L245NS or BNS | 0.14 | 0.40 | 1.35 | 0.020 | 0.003[e] | f | f | 0.04 | g | 0.36 | 0.19[h] |
| L290NS or X42NS | 0.14 | 0.40 | 1.35 | 0.020 | 0.003[e] | 0.05 | 0.05 | 0.04 | — | 0.36 | 0.19[h] |
| L360NS or X52NS | 0.16 | 0.45 | 1.65 | 0.020 | 0.003[e] | 0.10 | 0.05 | 0.04 | g | 0.43 | 0.22[h] |
| L360QS or X52QS | 0.16 | 0.45 | 1.65 | 0.020 | 0.003[e] | 0.07 | 0.05 | 0.04 | g | 0.39 | 0.20[h] |
| L390QS or X56QS | 0.16 | 0.45 | 1.65 | 0.020 | 0.003[e] | 0.07 | 0.05 | 0.04 | g | 0.40 | 0.21[h] |
| L415QS or X60QS | 0.16 | 0.45 | 1.65 | 0.020 | 0.003[e] | 0.08 | 0.05 | 0.04 | g, i, k | 0.41 | 0.22[h] |
| L450QS or X65QS | 0.16 | 0.45 | 1.65 | 0.020 | 0.003[e] | 0.09 | 0.05 | 0.06 | g, i, k | 0.42 | 0.22[h] |

a – According to the product analysis results (see 9.2.4 and 9.2.5). CEIIW limit values apply to carbon mass content > 0,12%, CEpcm limit values apply to carbon mass content ≤ 0,12%.
b – For each 0,01% of carbon content reduction below its specified maximum content, manganese content can be increased by 0,05% above its specified maximum content but no more than by 0,20%.
c – Total aluminum ≤ 0,060%, nitrogen ≤ 0,012%, AL/N ≥ 2:1 (not applicable to steels deoxidized with titanium or treated with titanium); Cu 0,35% (if agreed, Cu ≤ 0,10%); Ni ≤ 0,30%; Cr ≤ 0,30%; Mo ≤ 0,15%; B ≤ 0,0005%.
d – Unless otherwise agreed, in case of welded pipes with Ca intentionally added to steel, Ca/S ≥ 1,5 if S > 0,0015%. For seamless and welded pipes, Ca content ≤ 0,006%.
e – Maximum S content may be increased for seamless pipes to ≤ 0,008% and for welded pipes, by agreement, to ≤ 0,006%. In this case, a lower Ca/S ratio can be agreed for welded pipes.
f – Unless otherwise agreed, total niobium and vanadium content should be ≤ 0,06%.
g – Total content of niobium, vanadium and titanium should be ≤ 0,15%.
h – For seamless pipes, this value may be increased by 0,03%.
i – Subject to agreement, molybdenum content should be ≤ 0,35%.
j – Subject to agreement, chromium content should be ≤ 0,45%.
k – Subject to agreement, Cr content should be ≤ 0,45%, Ni ≤ 0,50%.

## Requirements for the chemical composition of heats and products in weight percents for PSL 2 offshore pipes, as per API* Spec 5L

| Steel grade | Mass fraction according to heat and product analysis, %, maximum | | | | | | | | | Carbon equivalent[a], %, maximum | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | C[b] | Si | Mn[b] | P | S | V | Nb | Ti | Other[c] | $CE_{IIW}$ | $CE_{Pcm}$ |
| L245NO or BNO | 0.14 | 0.40 | 1.35 | 0.020 | 0.010 | d | d | 0.04 | e, f | 0.36 | 0.19[h] |
| L290NO or X42NO | 0.14 | 0.40 | 1.35 | 0.020 | 0.010 | 0.05 | 0.05 | 0.04 | f | 0.36 | 0.19[h] |
| L360NO or X52NO | 0.16 | 0.45 | 1.65 | 0.020 | 0.010 | 0.10 | 0.05 | 0.04 | e | 0.43 | 0.22[h] |
| L390QO or X56QO | 0.16 | 0.45 | 1.65 | 0.020 | 0.010 | 0.07 | 0.05 | 0.04 | e, h | 0.40 | 0.21[h] |
| L415QO or X60QO | 0.16 | 0.45 | 1.65 | 0.020 | 0.010 | 0.08 | 0.05 | 0.04 | e, h | 0.41 | 0.22[h] |
| L450QO or X65QO | 0.16 | 0.45 | 1.65 | 0.020 | 0.010 | 0.09 | 0.05 | 0.06 | e, h | 0.42 | 0.22[h] |

a – According to the product analysis results (see 9.2.4 and 9.2.5). CEIIW limit values apply to carbon mass content > 0,12%, CEpcm limit values apply to carbon mass content ≤ 0,12%.
b – For each 0,01% of carbon content reduction below its specified maximum content, manganese content can be increased by 0,05% above its specified maximum content but no more than by 0,20%.
c – Total AL ≤ 0,060%, N ≤ 0,012%, AL/N ≥ 2:1 (does not apply to steels deoxidized with titanium or treated with titanium).
d – Unless otherwise agreed, total niobium and vanadium content should be ≤ 0,06%.
e – Total content of niobium, vanadium and titanium should be ≤ 0,15%.
f – Cu ≤ 0,30%, Ni ≤ 0,30%, Cr ≤ 0,30%, Mo ≤ 0,10%, B ≤ 0,0005%.
g – For seamless pipes, this value may be increased by 0,03% to a maximum of 0,25%.
h – Cu ≤ 0,50 %, Ni ≤ 0,50%, Cr ≤ 0,50%, Mo ≤ 0,50%, B ≤ 0,0005%.

# PIPES FOR UNDERWATER PIPELINES

Such pipes are intended for the construction of underwater crossings and offshore pipelines for the transportation of liquid and gaseous hydrocarbons and other media

MANUFACTURERS

VTZ, TAGMET, TMK PS

**FEATURES**

Seamless steel pipes for offshore subsea pipelines are manufactured at VTZ and TAGMET.

Manufacturing method includes hot forming (rolling) of steel billet according to the technology that provides a fine-grained steel structure, required purity of steel for harmful impurities and non-metallic inclusions. Pipes undergo volumetric heat treatment according to the established manufacturing procedures for obtaining final operating characteristics.

Longitudinal electric-welded steel pipes are manufactured at TMK PS in Volzhsky and Chelyabinsk using electric arc welding.

Distinctive features of such products are strict requirements for geometric parameters (outer diameter, wall thickness, ovality, curvature), as well as requirements for the quality of the outer and inner surface of pipes.

By agreement with the Customer, pipes can be supplied with an external anti-corrosion and inner flow coating and weighted concrete covering, applied in accordance with additional technical requirements.

Nominal sizes of underwater pipelines shall be in accordance with requirements in Table 3.

## Table 3. Standards

| Standards | Pipe dimensions | | | Steel grade, category |
|---|---|---|---|---|
| | Outside diameter, mm | Wall thickness,mm | Length, mm | |
| 1 | 2 | 3 | 4 | 5 |
| TU 14-156-93-2012<br>Seamless steel pipes for offshore subsea pipelines | 114-426 | 6.0-26.0 | 10.5-12.5 | Categories PCT36; PCT40; PCT420; PCT500; PCT550 or steel grades X52; X60; X65; X70; X80 |
| TU 14-3P-156-2021<br>Seamless steel pipes resistant to local elevated deformations for pipeline construction | 114-355 | 10.0-25.0 | 8.0-12.2 | X65Q; X65QO |
| TU 14-3P-176-2021<br>Seamless steel pipes resistant to local elevated deformations for pipeline construction | 57-426 | 4.5-36.0 | 10.5-12.6 | Steel grades K52; K56; K60 and L390; L415; L450; L485; X56; X60; X65; X70 |
| TU 24.20.21-205-57357928-2022<br>Longitudinal electric-welded steel pipes with outer diameter from 530 mm to 1220 mm for offshore gas pipeline construction | 530-1 220 | 8.0-14.0 | 20ФА; 13ХФА | 245-485 Mpa (SMYS) |
| TU 24.20.21-213-57357928-2022<br>Longitudinal electric-welded steel pipes for offshore subsea pipelines (PMPC) | 530-820 | 15.0-27.0 | 10.5-12.35 | X60; X65; X70; SAWL 415 IFD; SAWL 450 IFD; SAWL 485 IFD |
| TU 24.20.21-021-57357928-2022<br>Longitudinal electric-welded steel pipes for coastal (land) and offshore field pipelines | 508; 514; 813; 820 | 27.0; 30.1; 30.2; 32.2; 38.7; 40.8; 45.8; 46.8 | 6.0-12.6 | K60; X65; 450 IFD |
| TU 24.20.21-039-57357928-2022<br>Longitudinal electric-welded steel pipes for offshore pipelines | 508-1 220 | 8.0-41.0 | 10.5-12.2 | X60; X65; X70; SAWL 415 IFD; SAWL 450 IFD; SAWL 485 IFD |
| API* Spec 5L<br>Seamless pipes | 168.3-426 | 7.1-34.8 | 7.5-12.5 | B (L245); X42 (L290); X46 (L320); X52 (L360); X56 (L390); X60 (L415); X65 (L450); X70 (L485); X80 (L555) |
| LSAW pipes | 508.0-1 422.4 | 7.0-46.0 | 10.0-18.3 | |
| DNV-ST-F101<br>Submarine pipeline systems (seamless) | 219.0-426.0 | 7.0-31.0 | 8.0-12.5 | 250-450 |
| DNV-0S-F101<br>Submarine pipeline systems (LSAW) | 508-1 422 | 8.0-45.0 | 10.5-12.5 | 245-555 (F; D; I) |
| 1 | 2 | 3 | 4 | 5 |

# 02.

## Pipes for trunk pipelines

# LARGE DIAMETER PIPES

Submerged arc longitudinal welded large diameter pipes are used in oil and gas trunk pipelines, including submarine pipelines, oil gathering pipelines, general purpose pipelines, thermal power plant pipelines and in steel structures

MANUFACTURERS

TMK PS, VTZ

**FEATURES**

TMK PS (Volzhsky) produces large diameter pipes by roll-bending and longitudinal submerged arc welding (SAWL).

This is the most effective process to produce SAWL pipes with a diameter of up to 1,422 mm for trunk pipelines.

Uniform low stress distribution across the pipes body is one of the key factors ensuring pipes quality. Continuous change of shape in a roll-bending machine results in the best productivity, pipes geometry and uniformity of deformation along the entire pipes length.

TMK PS (Chelyabinsk) produces the widest range of single-seam and double-seam pipes, including pipes up to 18 m long. The plant uses advanced technology, including JCO forming, submerged arc welding, mechanical expansion and state-of-the-art nondestructive testing.

## Standards

| Standards | Pipes dimensions | | Steel grade |
|---|---|---|---|
| | Outside diameter, mm | Wall thickness, mm | |
| 1 | 2 | 3 | 4 |
| API* Spec 5L<br>Specification for line pipes | 508-1,422 | 7.1-48.0 | B; X42–X80 or L245–L555 |
| GOST 10706-76 / GOST 10704-91<br>Electric welded longitudinal steel pipes | 508-1,420 | 7.0-48.0 | St2kp; St2ps; St2sp; St3kp; St3ps; St3sp; low-alloy steel (Ce < 0.48%) |
| GOST 20295-85<br>Steel welded pipes for main gas-and-oil pipelines | 508-1,420 | 7.0-48.0 | K34; K38; K42; K50; K52; K54; K55; K56; K60 |
| GOST 31447-2012<br>Steel welded pipes for trunk gas pipelines, oil pipelines and oil products pipelines | 530-1,420 | 7.0-48.0 | K34; K38; K42; K48; K50; K52; K54; K55; K56; K60 |
| GOST 33228-2015<br>Steel welded pipes for general purposes | 508-1,420 | 7.0-34.0 | KP175–KP460 |
| GOST R 58064-2018<br>Steel welded pipes for building structure | 508-1,420 | 8.0-48.0 | C245 - C440 |
| GOST 3183-2015<br>Steel pipes for pipelines of petroleum and natural gas industries | 508-1,422 | 7.0-48.0 | A; B; X42; X46; X52; X56; X60; X65; X70; X80; L245; L290; L320; L360; L390; L415; L450; L485; L555 |
| BS EN 10217-1:2002<br>Welded steel tubes for pressure purposes. Part 1. Non-alloy steel tubes with specified room temperature properties | 508-1,422 | 8.0-40.0 | P195TR1; P235TR1; P265TR1<br>P195TR2; P235TR2; P265TR2 |
| DIN EN 10208-1<br>Steel pipes for pipelines for combustible fluids | 508-1,422 | 7.9-42.0 | L210GA - L300GA |
| DIN EN 10217-3:2019<br>Welded steel tubes for pressure purposes. Part 3. Electric welded and submerged arc welded alloy fine grain steel tubes with specified room, elevated and low temperature properties | 508-1,422 | 8.0-40.0 | P275-P460<br>(N; NH; NL1; NL2) |
| Offshore standard DNV-OS-F101. Submarine pipeline systems | 508-1,422 | 7.9-45.0 | 250 - 485 |
| ISO 3183-2019<br>Petroleum and natural gas industries. Steel pipes for pipeline transportation systems | 508-1,422 | 7.0-48.0 | B; X42–X80 or L245–L555 |
| ÖNORM EN 10219-1:2006 / ÖNORM EN 10219-2:2019<br>Cold formed welded structural hollow sections of non-alloy and fine grain steels. Part 1. Technical delivery conditions | 508-1,422 | 7.0-48.0 | Non-alloy steels: S235JRH; S275J0H; S275J2H; S355J0H; S355J2H; S355K2H.<br>Fine grain steels: S275MH–S460MLH; S275NH–S460NLH |
| 1 | 2 | 3 | 4 |

## Size range

| Outside diameter, mm | Wall thickness, mm | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 7.0 | 8.0 | 9.0 | 10.0 | 11.0 | 12.0 | 13.0 | 14.0 | 15.0 | 16.0 | 17.0 | 18.0 | 19.0 |
| | Weight per meter length, kg | | | | | | | | | | | | |
| 508 | 87.35 | 99.63 | 111.86 | 124.03 | 136.16 | 148.24 | 160.27 | 172.25 | 184.18 | 196.06 | 207.90 | 219.68 | 231.41 |
| 530 | 91.18 | 104.01 | 116.79 | 129.51 | 142.19 | 154.82 | 167.40 | 179.93 | 192.40 | 204.83 | 217.21 | 229.54 | 241.82 |
| 630 | 108.62 | 123.94 | 139.20 | 154.42 | 169.59 | 184.71 | 199.78 | 214.79 | 229.76 | 244.68 | 259.55 | 274.37 | 289.14 |
| 720 | | 141.87 | 159.38 | 176.84 | 194.25 | 211.61 | 228.92 | 246.18 | 263.39 | 280.55 | 297.66 | 314.72 | 331.73 |
| 820 | | | 181.79 | 201.74 | 221.64 | 241.49 | 261.30 | 281.05 | 300.75 | 320.40 | 340.00 | 359.55 | 379.05 |
| 914 | | | | 202.86 | 225.16 | 247.40 | 269.59 | 291.73 | 313.82 | 335.87 | 357.86 | 379.80 | 401.69 |
| 1,020 | | | | 251.56 | 276.44 | 301.27 | 326.05 | 350.78 | 375.47 | 400.10 | 424.68 | 449.22 | 473.70 |
| 1,220 | | | | | | 361.05 | 390.81 | 420.52 | 450.19 | 479.80 | 509.36 | 538.88 | 568.34 |
| 1,420 | | | | | | | | 490.26 | 524.91 | 559.50 | 594.05 | 628.54 | 662.99 |

## Standards (continued)

| Outside diameter, mm | Wall thickness, mm | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 20.0 | 21.0 | 22.0 | 23.0 | 24.0 | 25.0 | 26.0 | 27.0 | 28.0 | 29.0 | 30.0 | 31.0 | 32.0 | 33.0 |
| | Weight per meter length, kg | | | | | | | | | | | | | |
| 508 | 243.09 | 254.72 | 266.30 | 277.83 | 289.32 | 300.75 | | | | | | | | |
| 530 | 254.05 | 266.23 | 278.36 | 290.44 | 302.47 | 314.45 | 326.38 | 338.26 | 350.09 | 361.87 | | | | |
| 630 | 303.86 | 318.53 | 333.15 | 347.72 | 362.24 | 376.71 | 391.13 | 405.50 | 419.83 | 434.10 | 448.32 | | | |
| 720 | 348.69 | 365.60 | 382.47 | 399.28 | 416.04 | 432.75 | 449.41 | 466.03 | 482.59 | 499.10 | 515.57 | 531.98 | 548.34 | |
| 820 | 398.51 | 417.91 | 437.26 | 456.56 | 475.82 | 495.02 | 514.17 | 533.28 | 552.33 | 571.33 | 590.29 | 609.19 | 628.04 | 646.85 |
| 914 | 423.54 | 445.33 | 467.07 | 488.77 | 510.41 | 532.00 | 553.55 | 575.04 | 596.49 | 617.88 | 639.23 | 660.52 | 681.77 | 702.96 |
| 1,020 | 498.13 | 522.52 | 546.85 | 571.13 | 595.37 | 619.55 | 643.69 | 667.77 | 691.81 | 715.79 | 739.73 | 763.61 | 787.45 | 811.23 |
| 1,220 | 597.76 | 627.12 | 656.44 | 685.70 | 714.92 | 744.08 | 773.20 | 802.27 | 831.28 | 860.25 | 889.17 | 918.03 | 946.85 | 975.62 |
| 1,420 | 697.38 | 731.73 | 766.03 | 800.27 | 834.47 | 868.62 | 902.71 | 936.76 | 970.76 | 1,004.71 | 1,038.61 | 1,072.45 | 1,106.25 | 1,140.00 |

| Outside diameter, mm | Wall thickness, mm | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 34.0 | 35.0 | 36.0 | 37.0 | 38.0 | 39.0 | 40.0 | 41.0 | 42.0 | 43.0 | 44.0 | 45.0 | 46.0 | 47.0 | 48.0 |
| | Weight per meter length, kg | | | | | | | | | | | | | | |
| 508 | | | | | | | | | | | | | | | |
| 530 | | | | | | | | | | | | | | | |
| 630 | | | | | | | | | | | | | | | |
| 720 | | | | | | | | | | | | | | | |
| 820 | 665.60 | 684.31 | 702.96 | 721.57 | 740.12 | 758.63 | 777.09 | | | | | | | | |
| 914 | 724.11 | 745.21 | 766.25 | 787.25 | 808.19 | 829.09 | 849.94 | | | | | | | | |
| 1,020 | 834.97 | 858.66 | 882.29 | 905.88 | 929.41 | 952.90 | 976.34 | | | | | | | | |
| 1,220 | 1,004.33 | 1,033.00 | 1,061.62 | 1,090.19 | 1,118.70 | 1,147.17 | 1,175.59 | | | | | | | | |
| 1,420 | 1,173.70 | 1,207.35 | 1,240.95 | 1,274.50 | 1,308.00 | 1,341.44 | 1,374.84 | 1,408.19 | 1,441.49 | 1,474.74 | 1,507.95 | 1,541.10 | 1,574.20 | 1,607.25 | 1,640.25 |

The theoretical weight is given for single-seam pipes with a factor of 1.01 to account for weld reinforcement. In case of double-seam pipes, a factor of 1.015 is used.

# PIPES WITH THERMAL INSULATION AND WATERPROOF COATING

Pipes with thermal insulation and waterproof coating and connecting parts are designed for construction and repair of gas pipelines, oil pipelines, water pipelines, technological and field pipelines, heating networks of underground and aboveground pipelines

MANUFACTURERS

Uralchermet

**FEATURES**

Thermal insulation is produced by pouring mixture of polyurethane components into free space between the pipe or connecting part and protective shell which provides thermal insulation layer protection against mechanical damage, ultraviolet radiation and moisture.

Depending on the pipe laying method, protective shell is manufactured from galvanized steel for aboveground pipeline sections; from polyethylene or steel with anti-corrosion coating made of extruded polyethylene for underground pipeline sections.

**At the request of the customer, pipes with thermal insulation and waterproof coating and connecting parts can be equipped with:**

- Conductors of the operational remote control system
- Satellite tubes for heating the transported product in aboveground and underground pipelines
- Barrier-type inserts made of non-combustible materials to prevent the spread of fire

At the request of the customer, pipes and connecting parts can be treated with an anti-corrosion coating before thermal insulation is applied. Construction and type of the anti-corrosion coating is determined by the project and depends on the operating conditions of the section of the pipeline (method pipeline laying, temperature of the transported product, presence of a line heating system, etc.). As anti-corrosion coating for thermal insulation of pipes and connecting parts, extruded polyethylene coatings or epoxy powder paints should be used.

## Recommended outside diameter of products with thermal insulation and waterproof coating in polyethylene shell, thickness of thermal insulation layer and thickness of polyethylene shell wall

### Size

| Outside diameter of steel pipe* | Outside diameter of products with thermal insulation and waterproof coating in polyethylene shell* | | | | Nominal thickness of thermal insulation layer** | | Nominal thickness of polyethylene shell wall | |
|---|---|---|---|---|---|---|---|---|
| | Nominal | | (+) - Limit deviation | | | | | |
| | Type 1 | Type 2 | Type 1 | Type 2 | Type 1 | Type 2 | Type 1 | Type 2 |
| 57 | 125 | 140 | 3,7 | 4,1 | 31,5 | 38,5 | 2,5 | 3,0 |
| 76 | 140 | 160 | 4,1 | 4,7 | 29,0 | 39,0 | 3,0 | 3,0 |
| 89 | 160 | 180 | 4,7 | 5,4 | 32,5 | 42,5 | 3,0 | 3,0 |
| 108 | 180 | 200 | 5,4 | 5,9 | 33,0 | 43.0 | 3,0 | 3,2 |
| 114 | 200 | - | 6.3 | - | 40 | - | 3,2 | - |
| 133 | 225 | 250 | 6,6 | 7,4 | 42,5 | 54,5 | 3,5 | 3,9 |
| 159 | 250 | 280 | 7,4 | 8,3 | 41,6 | 56,1 | 3,9 | 4,4 |
| 219 | 315 | 355 | 9,8 | 10,4 | 43,1 | 62,4 | 4,9 | 4,9 |
| 273 | 400 | 450 | 11,7 | 13,2 | 57,9 | 82,9 | 5,6 | 5,6 |
| 325 | 450 | 500 | 13,2 | 14,6 | 56,9 | 81,3 | 5,6 | 5,6 |
| 377 | 500 | 560 | 14,6 | 16,3 | 55,3 | 84,5 | 6,2 | 6,2 |
| 426 | 560 | 600; 630 | 16,3 | 16,3 | 60,0 | 79,1; 94,1 | 7,0 | 7,9 |
| 530 | 710 | - | 20,4 | - | 81,1 | - | 8,9 | - |
| 630 | 800 | - | 23,4 | - | 75,0 | - | 10,0 | - |
| 720 | 900 | - | 26,3 | - | 78,8 | - | 11,2 | - |
| 820 | 1000 | 1100 | 29,2 | 32,1 | 77,6 | 126,2 | 12,4 | 12,4 |
| 920 | 1100 | 1200 | 32,1 | 35,1 | 76,2 | 125,1 | 13,8 | 14,9 |
| 1020 | 1200 | - | 35,1 | - | 75,1 | - | 14,9 | - |

* In agreement with the project organization, products of alternative diameters can be used.
** Thermal insulation layer thickness is stated without taking into account the thickness of anti-corrosion coating, tolerances for deviations of the axial lines of products from the axes of protective shells and deviations of the geometric dimensions of polyethylene shells.

## Recommended outside diameter of products with thermal insulation and waterproof coating in shells made of galvanized steel or steel with anti-corrosion coating made of extruded polyethylene. Thickness of thermal insulation layer.

### Size

| Outside diameter of steel pipe* | Size of galvanized steel shell | | Size of steel shell with anti-corrosion coating made of extruded polyethylene*** | | Nominal thickness of thermal insulation layer** |
|---|---|---|---|---|---|
| | Outside diameter | Wall thickness**** | Outside diameter | Wall thickness**** | |
| 57 | $125^{+5}$; $140^{+5}$ | 0,55 | $125^{+5}$; $140^{+5}$ | 1,0 | 33,4; 40,9 |
| 76 | $140^{+5}$; $160^{+5}$ | 0,55 | $140^{+5}$; $160^{+5}$ | 1,0 | 31,4; 41,4 |
| 89 | $160^{+5}$; $180^{+5}$ | 0,6 | $160^{+5}$; $180^{+5}$ | 1,0 | 34,9; 44,9 |
| 108 | $180^{+5}$; $200^{+5}$ | 0,6 | $180^{+5}$; $200^{+5}$ | 1,0 | 35,4; 45,4 |
| 133 | $225^{+5}$; $250^{+5}$ | 0,6 | $225^{+5}$; $250^{+5}$ | 1,0 | 45,4; 57,9 |
| 159 | $250^{+5}$; $280^{+5}$ | 0,7 | $250^{+5}$; $280^{+5}$ | 1,0 | 44,8; 59,8 |
| 219 | $315^{+5}$; $355^{+5}$ | 0,7 | $315^{+5}$; $355^{+5}$ | 1,0 | 47,3; 67,3 |
| 273 | $400^{+5}$; $450^{+5}$ | 0,8 | $400^{+5}$; $450^{+5}$ | 1,0 | 62,7; 87,7 |
| 325 | $450^{+5}$; $500^{+5}$ | 0,8 | $450^{+5}$; $500^{+5}$ | 1,0 | 61,7; 86,7 |
| 377 | $500^{+5}$; $560^{+5}$ | 1,0 | $500^{+5}$; $560^{+5}$ | 1,0 | 60,5; 90,5 |
| 426 | $560^{+5}$; $630^{+5}$ | 1,0 | $560^{+5}$; $630^{+5}$ | 1,0 | 66,0; 101,0 |
| 530 | $710^{+5}$ | 1,0 | $710^{+5}$ | 1,0 | 89,0 |
| 630 | $800^{+5}$ | 1,0 | $800^{+5}$ | 1,0 | 84,0 |
| 720 | $900^{+5}$ | 1,0 | $900^{+5}$ | 1,0 | 89,0 |
| 820 | $1000^{+5}$; $1100^{+5}$ | 1,0 | $1100^{+5}$; $1100^{+5}$ | 1,0 | 89,0; 139,0 |
| 920 | $1100^{+5}$; $1200^{+5}$ | 1,0 | $1100^{+5}$; $1200^{+5}$ | 1,0 | 89,0; 139,0 |
| 1020 | $1200^{+5}$ | 1,0 | $1200^{+5}$ | 1,0 | 89,0 |

* Wall thickness of the steel pipe is determined in the project. In agreement with the project organization, products of alternative diameters can be used.
** Thermal insulation layer thickness is stated without taking into account the thickness of anti-corrosion coating, tolerances for deviations of the axial lines of products from the axes of protective shells and deviations of the geometric dimensions of shells made of galvanized steel and steel with anti-corrosion extruded polyethylene coating.
*** Sizes are stated without taking into account the thickness of polyethylene of shells made of steel with anti-corrosion extruded polyethylene coating.
**** In agreement with the customer shells with alternative wall thickness can be used.

# 03.

## Industrial pipes

# GENERAL PURPOSE SEAMLESS PIPES

## (HOT AND COLD-FORMED PIPES)

Pipes for the manufacture of machine parts in the automotive, drilling, oil production, mining, crane and other machine-building sub-industries

MANUFACTURERS

VTZ, STZ, SinTZ, TAGMET, TMK-INOX, CHTPZ, PNTZ

**FEATURES**

Pipes are produced by hot, cold or warm rolling on cold pillgers or by drawing (with or without a plug). Pipes meet different requirements for dimensions, steel grades, manufacturing tolerances, mechanical properties, and surface quality, depending on the production technique and the requirements of applicable standards.

Random length pipes are manufactured with lengths between 1.5 m and 12.5 m; cut length pipes – between 4.5 m and 9 m. Cut length pipes may be produced with a length of up to 14.5 m by agreement between the parties.

Pipes are made of the following steels: 10, 20, 35, 45, 09G2S (by agreement between parties, pipes may be made of other steel grades as per GOST 1050, GOST 4543, GOST 19281, and DIN 17100).

Pipes undergo mandatory tensile testing and, if requested by the customer, hardness testing, bend, flattening, and drift-expanding.

Pipes can be made to customer specifications for dimensions and tolerances, including improved precision of wall thickness (+/-6%) and outside diameter (+/-0.5%), as well as extremely thick-walled pipes with a D/S ratio of up to 2.2 mm and a wall thickness of up to 67 mm.

Isothermal annealing and outside surface machining are available.

**SPECIAL CAPABILITIES**

- Cold-finished pipe diameter range: 0.8 mm–180 mm; wall thickness: 0.16 mm–12.0 mm
- Manufacture of pipes with non-standard dimensions
- Manufacture of pipes with non-standard tolerances
- Outer surface grinding
- Pipes heat treatment in furnaces with oxidizing or non-oxidizing atmospheres
- Manufacture of capillary tubes
- Nondestructive testing of pipes
- Hydraulic and pneumatic testing of pipes
- Protective coating of pipes

## Standards

| Standards | Pipes dimensions | | Steel grade |
|---|---|---|---|
| | Outside diameter, mm | Wall thickness, mm | |
| 1 | 2 | 3 | 4 |
| ASTM A 53/A53M<br>Standard Specification for Pipes, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless | 10.3-508 | 1.73-50 | A; B; C |
| ASTM A106/A106M<br>Standard Specification for Seamless Carbon Steel Pipes for High-Temperature Service | 219.1-323.8 | 7.8-25.4 | A; B; C |
| ASTM A179/A179M<br>Seamless Cold-Drawn Low-Carbon Steel Heat-Exchanger and Condenser Tubes | 19.05-31.75 | 2.11-3.05 | Low carbon |
| ASTM A210/A210M<br>Seamless Medium-Carbon Steel Boiler and Superheater Tubes | 57-127 | 4.0-28.0 | A-1; C |
| ASTM A333/A333M<br>Standard Specifications for Seamless and Welded Steel Pipes for Low-Temperature Service and Other Applications with Required Notch Toughness | 33.4-323.8 | 1.65-19.05 | Group 6 |
| | 48.3-168.3 | 5-22.2 | 1; 6 |
| | 219.1 | 8.18-30.4 | |
| | 273.0 | 7.08-34.9 | |
| | 323.8 | 9.53-33.32 | |
| | 355.6 | 9.53-27.79 | |
| | 406.4 | 9.53;<br>10.31-28.58 | |
| ASTM A335/335M<br>Standard Specification for Seamless Ferritic Alloy-Steel Pipes for High-Temperature Service | 26.7-60.3 | 3.18-5.54 | P-5 |
| ASTM A500/A500M<br>Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes | 23.0-76.0 | 2.0-10.0 | A; B; C |
| ASTM A519/A519M<br>Standard Specification for Seamless Carbon and Alloy Steel Mechanical Tubing | 21.3-73 | 2.77-9.53 | 1010 |
| DIN EN 10210 (DIN 2448)<br>Hot finished structural hollow sections of non-alloy and fine grain steels (circular) | 10.2-108* | 1.6-12.0 | S235JRH; S355J2H<br>S275J0H; S275J2H; S355J0H |
| | 33.7-406.4 | 3.2-25.0 | |
| DIN EN 10210-1/2<br>Hot finished steel structural hollow sections. Part 1. Technical delivery conditions. Part 2. Tolerances, dimensions and sectional properties | 33.7-323.9 | 3.2-25 | S355J2H; S235JRH; S275J0H;<br>S275J2H; S355J0H; S355K2H;<br>S355J2H |
| DIN EN 10216-1 (DIN 1629, DIN 1630)<br>Seamless steel tubes for pressure purposes. Technical delivery conditions | 32-426 | 2.9-55.0 | St. 37.0; St. 44.0;<br>St. 52;0; St.37.4;<br>St. 44.4; St. 52;4 |
| DIN 2448 Seamless Steel Pipes and Tubes.<br>Dimensions, Conventional Masses per Unit Length | 10.2-108* | 1.6-12.0 | |
| DIN 10216-1:2004<br>Seamless steel tubes for pressure purposes | 114.3-273.0 | 6.3-25.0 | P195TR1; P235TR1;<br>P265TR1; P195TR2;<br>P235TR2; P265TR2 |
| DIN EN 10224 (DIN 2460)<br>Non-alloy steel tubes and fittings for the conveyance of water and other aqueous liquids. Technical delivery conditions | 219.1-323.9 | 8.0-25.0 | St 37.4; St 44.4; St 52.4 |
| DIN EN 10255 (DIN 2440)<br>Non-alloy steel tubes suitable for welding and threading. Technical delivery conditions | 10.2-76.1 | 2.0-3.65 | St 33.2 |
| DIN EN 10255 (DIN 2441)<br>Non-alloy steel tubes suitable for welding and threading. Technical delivery conditions | 10.2-76.1 | 2.65-4.5 | St 33.2; S195T |
| DIN 17121<br>Seamless circular steel tubes for structural steelwork | 10.2-76.1 | 1.0-6.3 | St 37.2; St 44.2; St 52.3; St 37.3; St 44.3 |
| DIN 17175<br>Seamless tubes of heat-resistant steels | 10-88.9 | 2-10 | St 35.8; St 45.8 |
| DIN 2440/2441<br>Steel tubes medium-weight suitable for screwing. Steel tubes heavy-weight suitable for screwing | 26.9-76.1* | 2.65-4.5 | St 33 |
| EN 10305-4<br>Seamless cold drawn tubes for hydraulic and pneumatic power systems | 6.0-90.0* | 0.5-6.0 | E235; E355; C45E |
| GOST 14162-79<br>Steel tubes of small dimensions (capillary) | 0.8-5.0 | 0.1-1.6 | Corrosion-resistant steels and alloys according to GOST 5632-72; GOST 10994-74 |
| GOST 8645-68/13663-86<br>Rectangular steel tubes | 30x20-<br>150x100* | 2.5-10 | 10; 20; 35; 45; 09G2; 09G2S; 10G2 |
| GOST 8732-78, GOST 8731-74<br>Seamless hot-formed steel pipes | 38-550 | 3.5-90 | 10–70; 10Kh–45Kh; 18KhGT;<br>30KhGSA;<br>etc. by agreement |
| | 32-219 | 2.9-50 | 10; 20; 35; 45; 09G2S; 10G2; D;<br>13KhFA; 30KhGSA; 30KhMA; 40Kh;<br>etc. by agreement |
| GOST 8733-74<br>Seamless cold and hot-formed pipes. Specifications<br>GOST 8734-75<br>Seamless steel tubes cold-formed<br>GOST 32678-2014<br>Seamless and welded cold-formed steel pipes for general purposes. Specifications | 4.0-426 | 0.4-40 | 10; 20; 35; 45; 10G2; 20H; 40Kh;<br>30KhGSA; 15KhM and others by agreement |
| 1 | 2 | 3 | 4 |

## Standards (continued)

| Standards | Pipes dimensions | | Steel grade |
|---|---|---|---|
| | Outside diameter, mm | Wall thickness, mm | |
| 1 | 2 | 3 | 4 |
| GOST 11017-80<br>Steel seamless tubes for high pressure service* | 6–10 (Group A) | 1.6–3 (Group A) | 20 |
| | 6–25 (Group B) | 2–10 (Group B) | |
| GOST 12132-66<br>Electrically welded and seamless steel tubes for automotive and bicycle industries | 6-57* | 0.8-5.0 | 10; 20; 15Kh; 35; 45; 30KhGSA; 30KhMA |
| GOST 19277-73<br>Seamless steel tubes for oil and fuel lines | 5-60* | 0.8-3 | 20A; 30KhGSA; 30KhGSA-VD |
| GOST 21729-76<br>Cold-formed and hot-formed structural carbon and alloyed steel tubes | 4.0-159.0 | 0.4-12 | 20A; 45; 38KhA; 30KhGSA; 38Kh2MYuA; 12KhN3A; 12Kh2NVFA (EI-712); 30KhGSA-VD; 30KhGSN2A |
| GOST 22897-86<br>Seamless cold-formed pipes from alloys based on titanium<br>TU 14-3-615-77<br>Cold-formed seamless pipes from PT-1M and PT-7M alloys<br>TU 14-3-820-79<br>Seamless cold-formed pipes from alloys based on titanium<br>TU 14-3-843-79<br>Seamless extremely thin-walled pipes from PT-1M and PT-7M alloys | 5.0-50 | 1.0-5.5 | VT1-0; PT-1M; PT-7M |
| GOST 23270-89<br>Tubes-billets for mechanical treatment. Specifications | 38-426 | 3.5-55 | 10; 20; 35; 45; 2 OKh; 40Kh; 30KhGSA and other steel grades |
| GOST 30563-98<br>Seamless cold-formed carbon and alloy steel tubes for special purposes | 100-220 | 2.5-18 | 10; 20; 10G2A; 15KhM; 30KhMA; 09G2S |
| GOST 30564-98<br>Seamless hot-formed carbon and alloy steel tubes with special properties | 38-426 | 3.5-55 | 10; 20; 09G2S and other steel grades |
| GOST 32528-2013<br>Seamless hot-formed steel pipes | 38-550 | 3.5-90 | 10; 20; 35; 45; 20Kh; 40Kh; 30KhGSA; 05G2S and other steel grades |
| | 32-219 | 2.9-50 | 10; 20; 35; 45; 09G2S; 10G2; D; 13KhFA; 30KhGSA; 30KhMA; 40Kh; etc. by agreement |
| 1 | 2 | 3 | 4 |

* Cold-formed.

## Mechanical properties of seamless standard pipes

| Standards | Steel grade (pipes grade) | Ultimate tensile strength $\sigma_u$, N/mm$^2$ | Yield strength, $\sigma_y$, N/mm$^2$ | Yield strength, δ, % |
|---|---|---|---|---|
| | | min | | |
| GOST 8731-74 | 10<br>20<br>35<br>45<br>10G2<br>20Kh<br>40Kh<br>30KhGSA<br>15KhM | 353<br>412<br>510<br>588<br>421<br>431<br>657<br>686<br>431 | 216<br>245<br>294<br>323<br>265<br>–<br>–<br>–<br>225 | 24<br>21<br>17<br>14<br>21<br>16<br>9<br>11<br>21 |
| ASTM A53/A53M | A<br>B | 330<br>415 | 205<br>240 | ASTM formula<br>ASTM formula |

## Range of seamless hot-formed standard pipes as per GOST 8732-78

| Outside diameter, mm | Wall thickness/ mm | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 3 | 3.5 | 4 | 4.5 | 5 | 5.5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 14 | 16 | 17 | 18 | 20 | 22 | 25 | 28 | 30 | 32 | 36 | 40 | 45 | 50 | 55 |
| | Weight per meter length, kg | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 28* | 1.85 | 2.11 | 2.37 | 2.61 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 32* | 2.15 | 2.46 | 2.76 | 3.05 | 3.33 | | | | | | | | | | | | | | | | | | | | | | | | |
| 38 | 2.59 | 2.98 | 3.35 | 3.72 | 4.07 | 4.41 | 4.74 | | | | 6.91 | 7.32 | 7.69 | | | | | | | | | | | | | | | | |
| 42 | 2.89 | 3.32 | 3.75 | 4.16 | 4.56 | 4.95 | 5.33 | 6.04 | 6.71 | 7.32 | 7.89 | 8.41 | | | | | | | | | | | | | | | | | |
| 45 | 3.11 | 3.58 | 4.04 | 4.49 | 4.93 | 5.36 | 5.77 | 6.56 | 7.30 | 7.99 | 8.63 | 9.22 | 9.77 | | | | | | | | | | | | | | | | |
| 50 | 3.48 | 4.01 | 4.54 | 5.05 | 5.55 | 6.04 | 6.51 | 7.42 | 8.29 | 9.10 | 9.86 | 10.60 | 11.20 | 12.40 | | | | | | | | | | | | | | | |
| 54 | 3.77 | 4.36 | 4.93 | 5.49 | 6.04 | 6.58 | 7.10 | 8.11 | 9.07 | 9.99 | 10.90 | 11.70 | 12.40 | 13.80 | 15.00 | 15.50 | | | | | | | | | | | | | |
| 57 | 4.00 | 4.62 | 5.23 | 5.83 | 6.41 | 6.99 | 7.55 | 8.63 | 9.67 | 10.70 | 11.60 | 12.50 | 13.30 | 14.90 | 16.20 | 16.80 | 17.30 | | | | | | | | | | | | |
| 60 | 4.22 | 4.88 | 5.52 | 6.16 | 6.78 | 7.39 | 7.99 | 9.15 | 10.30 | 11.30 | 12.30 | 13.30 | 14.20 | 15.90 | 17.40 | 18.00 | 18.60 | 19.70 | | | | | | | | | | | |
| 63 | 4.44 | 5.14 | 5.82 | 6.49 | 7.15 | 7.80 | 8.43 | 9.67 | 10.90 | 12.00 | 13.10 | 14.10 | 15.10 | 16.90 | 18.50 | 19.30 | 20.00 | 21.20 | | | | | | | | | | | |
| 68 | 4.81 | 5.57 | 6.31 | 7.05 | 7.77 | 8.48 | 9.17 | 10.50 | 11.80 | 13.10 | 14.30 | 15.50 | 16.60 | 18.60 | 20.50 | 21.40 | 22.20 | 23.70 | | | | | | | | | | | |
| 70 | 4.96 | 5.74 | 6.51 | 7.27 | 8.01 | 8.75 | 9.47 | 10.90 | 12.20 | 13.50 | 14.80 | 16.00 | 17.20 | 19.30 | 21.30 | 22.20 | 23.10 | 24.70 | | | | | | | | | | | |
| 73 | | 6.00 | 6.81 | 7.60 | 8.38 | 9.16 | 9.91 | 11.40 | 12.80 | 14.20 | 15.50 | 16.80 | 18.10 | 20.40 | 22.50 | 23.50 | 24.40 | 26.10 | | | | | | | | | | | |
| 76 | | 6.26 | 7.10 | 7.93 | 8.75 | 9.56 | 10.40 | 11.90 | 13.40 | 14.90 | 16.30 | 17.60 | 18.90 | 21.40 | 23.70 | 24.70 | 25.80 | 27.60 | | | | | | | | | | | |
| 83 | | | 7.79 | 8.71 | 9.62 | 10.50 | 11.40 | 13.10 | 14.80 | 16.40 | 18.00 | 19.50 | 21.00 | 23.80 | 26.40 | 27.70 | 28.90 | 31.10 | 33.10 | | | | | | | | | | |
| 89 | | | 8.38 | 9.38 | 10.40 | 11.30 | 12.30 | 14.20 | 16.00 | 17.80 | 19.50 | 21.20 | 22.80 | 25.90 | 28.80 | 30.20 | 31.50 | 34.00 | 36.40 | | | | | | | | | | |
| 95 | | | 8.98 | 10.04 | 11.10 | 12.10 | 13.20 | 15.20 | 17.20 | 19.10 | 21.00 | 22.80 | 24.60 | 28.00 | 31.20 | 32.70 | 34.20 | 37.00 | 39.60 | 43.20 | 46.26 | | | | | | | | |
| 102 | | | 9.67 | 10.82 | 12.00 | 13.10 | 14.20 | 16.40 | 18.50 | 20.60 | 22.70 | 24.70 | 26.60 | 30.40 | 33.90 | 35.60 | 37.30 | 40.40 | 43.40 | 47.50 | 51.10 | 53.30 | | | | | | | |
| 108 | | | 10.26 | 11.49 | 12.70 | 13.90 | 15.10 | 17.40 | 19.70 | 22.00 | 24.20 | 26.30 | 28.40 | 32.50 | 36.30 | 38.20 | 40.00 | 43.40 | 46.70 | 51.20 | 55.20 | 57.70 | | | | | | | |
| 114 | | | | | 13.40 | 14.70 | 16.00 | 18.50 | 20.90 | 23.30 | 25.70 | 27.90 | 30.20 | 34.50 | 38.70 | 40.70 | 42.60 | 46.40 | 49.90 | 54.90 | 59.40 | 62.10 | | | | | | | |
| 121 | | | | | 14.30 | 15.70 | 17.00 | 19.70 | 22.30 | 24.90 | 27.40 | 29.80 | 32.30 | 36.90 | 41.40 | 43.60 | 45.70 | 49.80 | 53.70 | 59.20 | 64.20 | 67.30 | 70.20 | | | | | | |
| 127 | | | | | 15.00 | 16.50 | 17.90 | 20.70 | 23.50 | 26.20 | 28.90 | 31.50 | 34.00 | 39.00 | 43.80 | 46.10 | 48.40 | 52.80 | 57.00 | 62.90 | 68.40 | 71.80 | 75.00 | | | | | | |
| 133 | | | | | 15.80 | 17.30 | 18.80 | 21.80 | 24.70 | 27.50 | 30.30 | 33.10 | 35.80 | 41.10 | 46.20 | 48.60 | 51.10 | 55.70 | 60.20 | 66.60 | 72.50 | 76.20 | 79.70 | 86.10 | | | | | |
| 140 | | | | | 16.60 | 18.20 | 19.80 | 23.00 | 26.00 | 29.10 | 32.10 | 35.00 | 37.90 | 43.50 | 48.90 | 51.60 | 54.20 | 59.20 | 64.00 | 70.90 | 77.30 | 81.80 | 85.20 | 92.30 | | | | | |
| 146 | | | | | 17.40 | 19.10 | 20.70 | 24.00 | 27.20 | 30.40 | 33.50 | 36.60 | 39.70 | 45.60 | 51.30 | 54.10 | 56.80 | 62.10 | 67.30 | 74.60 | 81.50 | 85.80 | 90.00 | 97.70 | 104.60 | | | | |
| 152 | | | | | 18.10 | 19.90 | 21.60 | 25.00 | 28.40 | 31.70 | 35.00 | 38.30 | 41.40 | 47.60 | 53.70 | 56.50 | 59.50 | 65.10 | 70.50 | 78.30 | 85.60 | 90.30 | 94.70 | 103.00 | 110.50 | | | | |
| 159 | | | | | 19.00 | 20.80 | 22.60 | 26.20 | 29.80 | 33.30 | 36.70 | 40.20 | 43.60 | 50.10 | 56.40 | 59.50 | 62.60 | 68.60 | 74.30 | 82.60 | 90.50 | 95.40 | 100.20 | 109.20 | 117.40 | | | | |
| 168 | | | | | | | 24.00 | 27.80 | 31.60 | 35.30 | 39.00 | 42.60 | 46.20 | 53.20 | 60.00 | 63.30 | 66.60 | 73.00 | 79.20 | 88.20 | 96.70 | 102.10 | 107.30 | 117.20 | 126.30 | 136.50 | | | |
| 180 | | | | | | | | 29.87 | 33.90 | 38.00 | 41.90 | 45.80 | 49.70 | 57.30 | 64.70 | 68.30 | 71.90 | 78.90 | 85.70 | 95.60 | 105.00 | 111.00 | 116.80 | 127.80 | 138.10 | 149.80 | | | |
| 194 | | | | | | | 27.82 | 32.28 | 36.70 | 41.10 | 45.40 | 49.60 | 53.90 | 62.10 | 70.20 | 74.20 | 78.10 | 85.80 | 93.30 | 104.20 | 114.90 | 121.30 | 127.80 | 140.30 | 151.90 | 165.40 | 177.60 | | |
| 203 | | | | | | | 29.15 | 33.84 | 38.50 | 43.10 | 47.60 | 52.10 | 56.50 | 65.30 | 73.80 | 78.00 | 82.10 | 90.30 | 98.20 | 109.70 | 120.80 | 128.00 | 134.90 | 148.30 | 160.80 | 175.30 | 188.70 | 200.74 | |
| 219 | | | | | | | 31.50 | 36.60 | 41.60 | 46.60 | 51.50 | 56.40 | 61.30 | 70.80 | 80.10 | 84.70 | 89.20 | 98.20 | 106.90 | 119.60 | 131.90 | 139.80 | 147.60 | 162.50 | 176.60 | 193.10 | 208.40 | 222.45 | |
| 245 | | | | | | | | | 46.80 | 52.40 | 58.00 | 63.50 | 69.00 | 79.80 | 90.40 | 95.60 | 100.80 | 111.00 | 121.00 | 135.60 | 149.80 | 159.10 | 168.10 | 185.60 | 202.20 | 222.00 | 240.50 | | |
| 273 | | | | | | | | 45.92 | 52.30 | 58.60 | 64.90 | 71.10 | 77.20 | 89.40 | 101.40 | 107.30 | 113.20 | 124.80 | 136.20 | 152.90 | 169.18 | 179.78 | | | | | | | |
| 325 | | | | | | | | | 62.50 | 70.10 | 77.70 | 85.20 | 92.60 | 107.40 | 121.90 | 129.10 | 129.10 | 150.40 | 164.40 | 185.00 | | | | | | | | | |
| 351 | | | | | | | | | | | 84.10 | 92.20 | 100.30 | 116.40 | 132.20 | 140.00 | 147.80 | 163.30 | 178.50 | 201.00 | | | | | | | | | |
| 426 | | | | | | | | | | | 102.59 | 112.58 | 122.50 | 142.20 | 161.80 | 171.50 | 181.10 | 200.20 | 219.20 | 247.20 | | | | | | | | | |

## Size range

| Outside diameter, mm | Wall thickness, mm | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0.8 | 1.0 | 1.2 | 1.4 | 1.5 | 1.6 | 1.8 | 2.0 | 2.2 | 2.5 | 2.8 | 3.0 | 3.2 | 3.5 | 4.0 | 4.5 | 5.0 | 5.5 | 6.0 |
| | Weight per meter length, kg | | | | | | | | | | | | | | | | | | |
| 5 | 0.083 | 0.099 | 0.112 | 0.124 | 0.129 | | | | | | | | | | | | | | |
| 6 | 0.103 | 0.123 | 0.142 | 0.159 | 0.166 | 0.174 | 0.186 | 0.197 | | | | | | | | | | | |
| 7 | 0.122 | 0.148 | 0.172 | 0.193 | 0.203 | 0.213 | 0.231 | 0.247 | 0.260 | 0.277 | | | | | | | | | |
| 8 | 0.142 | 0.173 | 0.201 | 0.228 | 0.240 | 0.253 | 0.275 | 0.296 | 0.315 | 0.339 | | | | | | | | | |
| 9 | 0.162 | 0.197 | 0.231 | 0.262 | 0.277 | 0.292 | 0.320 | 0.345 | 0.369 | 0.401 | | | | | | | | | |
| 10 | 0.182 | 0.222 | 0.260 | 0.297 | 0.314 | 0.332 | 0.364 | 0.395 | 0.426 | 0.462 | 0.497 | 0.518 | 0.537 | 0.561 | | | | | |
| 11 | 0.201 | 0.247 | 0.290 | 0.331 | 0.351 | 0.371 | 0.408 | 0.444 | 0.477 | 0.524 | 0.566 | 0.592 | 0.616 | 0.647 | | | | | |
| 12 | 0.221 | 0.271 | 0.320 | 0.366 | 0.388 | 0.410 | 0.453 | 0.493 | 0.532 | 0.586 | 0.635 | 0.666 | 0.694 | 0.734 | | | | | |
| 13 | 0.241 | 0.296 | 0.349 | 0.401 | 0.425 | 0.450 | 0.497 | 0.543 | 0.586 | 0.647 | 0.704 | 0.740 | 0.773 | 0.820 | 0.888 | | | | |
| 14 | 0.260 | 0.321 | 0.379 | 0.435 | 0.462 | 0.489 | 0.542 | 0.592 | 0.640 | 0.709 | 0.773 | 0.814 | 0.852 | 0.906 | 0.986 | | | | |
| 15 | 0.280 | 0.345 | 0.408 | 0.470 | 0.499 | 0.529 | 0.586 | 0.641 | 0.694 | 0.771 | 0.842 | 0.888 | 0.931 | 0.993 | 1.085 | | | | |
| 16 | 0.300 | 0.370 | 0.438 | 0.504 | 0.536 | 0.568 | 0.630 | 0.691 | 0.749 | 0.832 | 0.911 | 0.962 | 1.010 | 1.079 | 1.184 | 1.276 | 1.356 | | |
| 17 | 0.320 | 0.395 | 0.468 | 0.539 | 0.573 | 0.608 | 0.675 | 0.740 | 0.803 | 0.894 | 0.981 | 1.036 | 1.089 | 1.165 | 1.282 | 1.387 | 1.480 | | |
| 18 | 0.339 | 0.419 | 0.497 | 0.573 | 0.610 | 0.647 | 0.719 | 0.789 | 0.857 | 0.956 | 1.050 | 1.110 | 1.168 | 1.252 | 1.381 | 1.498 | 1.603 | | |
| 19 | 0.359 | 0.444 | 0.527 | 0.608 | 0.647 | 0.687 | 0.764 | 0.838 | 0.911 | 1.017 | 1.119 | 1.184 | 1.247 | 1.338 | 1.480 | 1.609 | 1.726 | | |
| 20 | 0.379 | 0.469 | 0.556 | 0.642 | 0.684 | 0.726 | 0.808 | 0.888 | 0.966 | 1.079 | 1.188 | 1.258 | 1.326 | 1.424 | 1.578 | 1.720 | 1.850 | 1.967 | 2.072 |
| 21 | 0.399 | 0.493 | 0.586 | 0.677 | 0.721 | 0.765 | 0.852 | 0.937 | 1.020 | 1.141 | 1.257 | 1.332 | 1.405 | 1.511 | 1.677 | 1.831 | 1.973 | 2.102 | 2.220 |
| 22 | 0.418 | 0.518 | 0.616 | 0.711 | 0.758 | 0.805 | 0.897 | 0.986 | 1.074 | 1.202 | 1.326 | 1.406 | 1.484 | 1.597 | 1.776 | 1.942 | 2.096 | 2.238 | 2.368 |
| 23 | 0.438 | 0.543 | 0.645 | 0.746 | 0.795 | 0.844 | 0.941 | 1.036 | 1.129 | 1.264 | 1.395 | 1.480 | 1.563 | 1.683 | 1.874 | 2.053 | 2.220 | 2.374 | 2.515 |
| 24 | 0.458 | 0.567 | 0.675 | 0.780 | 0.832 | 0.884 | 0.985 | 1.085 | 1.183 | 1.326 | 1.464 | 1.554 | 1.641 | 1.769 | 1.973 | 2.164 | 2.343 | 2.509 | 2.663 |
| 25 | 0.477 | 0.592 | 0.704 | 0.815 | 0.869 | 0.923 | 1.030 | 1.134 | 1.237 | 1.387 | 1.533 | 1.628 | 1.720 | 1.856 | 2.072 | 2.275 | 2.466 | 2.645 | 2.811 |
| 26 | 0.497 | 0.617 | 0.734 | 0.849 | 0.906 | 0.963 | 1.074 | 1.184 | 1.291 | 1.449 | 1.602 | 1.702 | 1.800 | 1.942 | 2.170 | 2.386 | 2.589 | 2.781 | 2.959 |
| 27 | 0.517 | 0.641 | 0.764 | 0.884 | 0.943 | 1.002 | 1.119 | 1.233 | 1.346 | 1.511 | 1.671 | 1.776 | 1.878 | 2.208 | 2.269 | 2.497 | 2.713 | 2.916 | 3.107 |
| 28 | 0.537 | 0.666 | 0.793 | 0.918 | 0.980 | 1.042 | 1.163 | 1.282 | 1.400 | 1.572 | 1.740 | 1.850 | 1.957 | 2.115 | 2.368 | 2.608 | 2.836 | 3.052 | 3.255 |
| 30 | 0.576 | 0.715 | 0.852 | 0.987 | 1.054 | 1.121 | 1.252 | 1.381 | 1.508 | 1.695 | 1.878 | 1.998 | 2.115 | 2.287 | 2.565 | 2.830 | 3.083 | 3.323 | 3.551 |
| 32 | 0.616 | 0.764 | 0.911 | 1.056 | 1.128 | 1.200 | 1.341 | 1.480 | 1.617 | 1.819 | 2.016 | 2.146 | 2.273 | 2.460 | 2.762 | 3.052 | 3.329 | 3.594 | 3.847 |
| 34 | 0.655 | 0.814 | 0.971 | 1.126 | 1.202 | 1.278 | 1.429 | 1.578 | 1.725 | 1.942 | 2.154 | 2.294 | 2.430 | 2.633 | 2.959 | 3.274 | 3.576 | 3.866 | 4.143 |
| 35 | 0.675 | 0.838 | 1.000 | 1.160 | 1.239 | 1.318 | 1.474 | 1.628 | 1.780 | 2.004 | 2.223 | 2.367 | 2.510 | 2.719 | 3.058 | 3.385 | 3.699 | 4.001 | 4.291 |
| 36 | 0.694 | 0.863 | 1.030 | 1.195 | 1.276 | 1.357 | 1.518 | 1.677 | 1.834 | 2.065 | 2.293 | 2.441 | 2.588 | 2.805 | 3.157 | 3.496 | 3.822 | 4.137 | 4.439 |
| 38 | 0.734 | 0.912 | 1.089 | 1.264 | 1.350 | 1.436 | 1.607 | 1.776 | 1.942 | 2.189 | 2.431 | 2.589 | 2.746 | 2.978 | 3.354 | 3.718 | 4.069 | 4.408 | 4.735 |
| 40 | 0.773 | 0.962 | 1.148 | 1.333 | 1.424 | 1.515 | 1.696 | 1.874 | 2.051 | 2.312 | 2.569 | 2.737 | 2.904 | 3.150 | 3.551 | 3.940 | 4.316 | 4.680 | 5.031 |
| 42 | | 1.011 | 1.207 | 1.402 | 1.498 | 1.594 | 1.785 | 1.973 | 2.159 | 2.435 | 2.707 | 2.885 | 3.062 | 3.323 | 3.749 | 4.162 | 4.562 | 4.951 | 5.327 |
| 45 | | 1.085 | 1.296 | 1.505 | 1.609 | 1.712 | 1.918 | 2.121 | 2.322 | 2.620 | 2.914 | 3.107 | 3.299 | 3.582 | 4.044 | 4.495 | 4.932 | 5.358 | 5.771 |
| 48 | | 1.159 | 1.395 | 1.609 | 1.720 | 1.831 | 2.051 | 2.269 | 2.435 | 2.805 | 3.121 | 3.329 | 3.535 | 3.841 | 4.340 | 4.827 | 5.302 | 5.765 | 6.215 |
| 50 | | 1.208 | 1.444 | 1.678 | 1.794 | 1.910 | 2.140 | 2.368 | 2.594 | 2.929 | 3.259 | 3.477 | 3.693 | 4.014 | 4.538 | 5.049 | 5.549 | 6.036 | 6.511 |
| 51 | | | | 1.712 | 1.831 | 1.949 | 2.184 | 2.417 | 2.648 | 2.990 | 3.328 | 3.551 | 3.772 | 4.100 | 4.636 | 5.160 | 5.672 | 6.172 | 6.659 |
| 53 | | | | 1.782 | 1.905 | 2.028 | 2.273 | 2.515 | 2.756 | 3.114 | 3.466 | 3.699 | 3.930 | 4.273 | 4.834 | 5.382 | 5.919 | 6.443 | 6.955 |
| 54 | | | | 1.816 | 1.942 | 2.068 | 2.317 | 2.565 | 2.810 | 3.175 | 3.535 | 3.773 | 4.009 | 4.359 | 4.932 | 5.493 | 6.042 | 6.578 | 7.103 |
| 56 | | | | 1.885 | 2.016 | 2.147 | 2.406 | 2.663 | 2.919 | 3.298 | 3.674 | 3.921 | 4.167 | 4.532 | 5.130 | 5.715 | 6.289 | 6.850 | 7.398 |
| 57 | | | | 1.920 | 2.053 | 2.186 | 2.450 | 2.713 | 2.973 | 3.360 | 3.743 | 3.995 | 4.246 | 4.618 | 5.228 | 5.826 | 6.412 | 6.985 | 7.546 |
| 60 | | | | 2.023 | 2.164 | 2.304 | 2.584 | 2.861 | 3.136 | 3.545 | 3.950 | 4.217 | 4.482 | 4.877 | 5.524 | 6.159 | 6.782 | 7.392 | 7.990 |
| 63 | | | | 2.127 | 2.275 | 2.423 | 2.717 | 3.009 | 3.499 | 3.730 | 4.157 | 4.439 | 4.719 | 5.136 | 5.820 | 6.492 | 7.152 | 7.799 | 8.434 |
| 65 | | | | 2.196 | 2.349 | 2.502 | 2.806 | 3.107 | 3.407 | 3.853 | 4.295 | 4.587 | 4.877 | 5.308 | 6.017 | 6.714 | 7.398 | 8.070 | 8.730 |
| 68 | | | | 2.299 | 2.460 | 2.620 | 2.939 | 3.255 | 3.570 | 4.038 | 4.502 | 4.809 | 5.113 | 5.567 | 6.313 | 7.047 | 7.768 | 8.477 | 9.174 |
| 70 | | | | 2.368 | 2.534 | 2.699 | 3.027 | 3.354 | 3.673 | 4.162 | 4.640 | 4.957 | 5.271 | 5.740 | 6.511 | 7.269 | 8.015 | 8.749 | 9.470 |
| 73 | | | | 2.472 | 2.645 | 2.817 | 3.161 | 3.502 | 3.841 | 4.347 | 4.847 | 5.179 | 5.508 | 5.999 | 6.807 | 7.602 | 8.385 | 9.156 | 9.914 |
| 75 | | | | | | | | | | | | 5.327 | 5.666 | 6.172 | 7.004 | 7.824 | 8.631 | 9.427 | 10.210 |
| 76 | | | | | | | | | | | | 5.401 | 5.745 | 6.258 | 7.103 | 7.935 | 8.755 | 9.562 | 10.358 |
| 80 | | | | | | | | | | | | 5.697 | 6.060 | 6.603 | 7.497 | 8.379 | 9.248 | 10.105 | 10.950 |

# GENERAL PURPOSE WELDED PIPES

## (PIPES FOR WATER AND GAS SUPPLY, HOLLOW SECTIONS AND GALVANIZED PIPES)

General purpose welded pipes for water and gas supply and hollow sections are designed for use in the machine building, utility, construction, and other industries

MANUFACTURERS

STZ, TMK-CPW, TAGMET, PNTZ

**FEATURES**

Welded pipes are made by induction seam welding or furnace welding, with or without normalization of the whole pipes volume, local heat treatment of weld seams and hot reduction.

Such normalization, local heat treatment of weld seams and hot reduction result in uniform properties of the parent and weld metal as well as high strength and toughness characteristics.

Pipes welding with oxygen supplied to strip edges improves weld seam quality.

Pipes are supplied with outer and inner surfaces galvanized or non-galvanized, depending on the customer's requirements. Pipes are galvanized by hot dipping in zinc melt, with the resulting zinc coating thickness of no less than 30 mm.

Strength properties are controlled by bend, cold drift-expanding, and flattening testing.

Water and gas line pipes with sizes between 15 mm and 50 mm can be supplied with plain ends or with thread and couplings, or with plain ends and with couplings. Anti-corrosion coating can be applied to non-galvanized pipes at the customer's request.

At the customer's request, all welded pipes can be supplied with caps protecting pipes ends against damage and corrosion.

Pipes can be supplied with removed internal flash. Welded pipes is delivered in carloads or in small batches by truck.

**SPECIAL CAPABILITIES**

Wide range of pipes with diameters from 10 mm to 530 mm inclusive.

**Equipment for the following operations:**

- Galvanizing of outer and inner surface of pipe
- Pipe heat treatment (normalization)
- Local heat treatment of welded seams
- Hydrostatic testing of pipes
- Nondestructive testing of welded seams and pipes body
- Application of protective coating to pipe surface
- Pipe bundling

## Standards

| Standards | Dimensions of pipes and sections | | Steel grade |
|---|---|---|---|
| | Outside diameter, mm | Wall thickness, mm | |
| 1 | 2 | 3 | 4 |
| API* Spec 5CT/ISO 11960<br>Specification for Casing and Tubing | 168.28-508 | 10.3-12 | N-80; J-55; K55 |
| API* Spec 5L<br>Specification for Line Pipes | 88.9-219.1 | 3.96-6.35 | A25; A; B; X42 |
| GOST 3262-75<br>Water-supply and gas-supply steel pipes | 17.0-114.0 | 2.5-4.5 | as per GOST 380-2005 and GOST 1050-2013 |
| | 21.3-114 | 4-11.5 | |
| GOST 5005-82<br>Steel electrical welded cold-formed tubes for cardan shafts | ins. 45<br>ins. 46<br>ins. 55<br>ins. 66 | 2.5<br>2.5<br>2.0; 2.5<br>1.6 | 08kp; 08ps; 10; 10ps; 15; 15ps; 20; 20ps |
| GOST 8639-82<br>Square steel tubes | 40x40 | 2 | 2ps |
| GOST 8645-68<br>Rectangular steel tubes | 60x40 | 2 | 2ps |
| GOST 10704-91 (GOST 10705-80)<br>Electric welded longitudinal steel pipes | 12-70 | 0.8-3.0 | 08; 08kp; 08ps; 08Yu; 10; 10kp; 10ps; 15; 15kp; 15ps; 20; 20kp; 20ps; St1sp; St1kp; St1ps; St2sp; St2kp; St2ps; St3sp; St3kp; St3ps; St4sp; St4kp; St4ps; 09G2S |
| GOST 10705-80<br>Electrically welded steel tubes. Range as per GOST 10704-91.<br>For pipelines and various structures | 16-530 | 2-12 | 08kp; 08ps; 08Yu; 08; 10kp; 10ps; 10; 15kp; 15ps; 15; 20kp; 20ps; 20; St2kp; St2ps; St2sp; St3kp; St3ps; St3sp; St4kp; St4ps; St4sp; 22GYu; 09G2S; 17G1S; 13KhFA; 17G1S-U |
| GOST 10707-80<br>Steel cold formed electrically welded tubes | 16-30<br>32-60 | 1.0-1.5<br>1.0-2.5 | 08; 08kp; 08ps; 10; 10kp; 10ps; 15; 15kp; 15ps; 20; 20kp; 20ps; St1sp; St1kp; St1ps; St2sp; St2kp; St2ps; St3sp; St3kp; St3ps; St4sp; St4kp; St4ps |
| GOST 32678-2014<br>Seamless and welded cold-formed steel pipes for general purposes | 6 | 1.0 | 08Yu |
| | 6-12 | 0.7-1.0 | |
| GOST 13663-86<br>Shaped steel tubes. Technical requirements.<br>Range as per GOST 8639-82, GOST 8645-68 | 15x15; 20x20; 25x25; 28x25; 30x15; 30x20; 30x30; 35x15; 30x60; 20x40; 40x40; 40x25; 50x20; 50x25; 40x28; 50x50; 60x30; 60x40; 60x60; 80x40 | 1-4 | St2; St3; 08; 08kp; 08ps; 10ps; 10; 20 |
| GOST 20295-85<br>Steel welded pipes for main gas-and-oil pipelines<br>Specifications | 114; 127; 133; 146; 530; 159; 168; 219; 245; 273; 325; 377; 426; 530 | 3.5-12 | K34-K60 |
| GOST 30245-2003<br>Steel bent closed welded square and rectangular section for building<br>Specifications | 40-60x25-60; 80x40; 150x150; 120x60; 140x60; 100-250x80-200; 80-120x80-120; 120x60; 120x80; 140x60; 140x100; 150x100; 160x80 | 3-5 | St2; St3; 10; 20; 22GYu; 09G2S |
| | 100x100; 120x120; 140x140; 160x160 | 3.5-6.0 | |
| DIN 1626<br>Welded circular unalloyed steel tubes subject to special requirements (DIN EN 10296-1 Welded circular steel tubes for mechanical and general engineering purposes) | 12-63.5 | 0.8-3.2 | St 37;0; USt 37;0; St 44;0 |
| DIN EN 10208-1<br>Steel pipes for pipelines for combustible fluids. Technical delivery conditions | 21.3-219.1 | 6-11.5 | L210GA; L235GA; L245GA; L290GA; L360GA |
| DIN EN 10217-1<br>Welded steel tubes for pressure purposes. Technical delivery conditions | 21.3-508 | 6-11.5 | P195TR1; P195TR2;<br>P235TR1; P235TR2;<br>P265TR1; P265TR2 |
| DIN EN 10219-1/2<br>Cold formed welded structural hollow sections of non-alloy and fine grain steels | 76.1-508.0; 100x100; 120x60; 120x80; 120x120; 150x100; 160x80; 180x180; 200x200; 250x150 | 6.0-12.0 | S235JRH; S275J0H;<br>S275J2H; S355J0H;<br>S355J2H |
| DIN EN 10224<br>Non-alloy steel tubes and fittings for the conveyance of water and other aqueous liquids | 21.3-219.1 | 6-11.5 | L235; L275; L355 |
| DIN EN 10255<br>Non-alloy steel tubes suitable for welding and threading. Technical delivery conditions | 21.3-114.3 | 6-11.5 | S195T |
| | 17.0-114.3 | 2.3-4.5 | |
| DIN EN 10296-1<br>Welded circular steel tubes for mechanical and general engineering purposes | 12-63.5 | 0.8-3.0 | RSt 34-2; RSt 37-2; St 44-2; E195; E235; E275; E355 |
| | 21.3-219.1 | 6-11.5 | E155; E190; E195; E220; E235; E260; E275; E320; E355; E370 |
| EN 10305-2<br>Steel tubes for precision applications. Technical delivery conditions. Welded cold drawn tubes | 16-30 | 1.0-1.5 | E195; E235; E275; E355 |
| | 32-60 | 1.0-2.5 | |
| 1 | 2 | 3 | 4 |

## Welded pipes range

| Outside diameter, mm | Wall thickness, mm | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0.8 | 1.0 | 1.2 | 1.5 | 1.8 | 1.9 | 2.0 | 2.2 | 2.3 | 2.5 | 2.65 | 2.8 | 3.0 | 3.2 | 3.5 | 3.65 | 3.8 | 4.0 | 4.5 | 5.0 | 5.5 | 6.0 | 7.0 | 8.0 |
| | Weight per meter length, kg | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | | 0.222 | 0.260 | | | | | | | | | | | | | | | | | | | | | |
| 12 | | 0.271 | 0.320 | 0.388 | | | | | | | | | | | | | | | | | | | | |
| 16 | 0.300 | 0.370 | 0.438 | 0.536 | | | 0.691 | | | | | | | | | | | | | | | | | |
| 18 | | 0.419 | 0.497 | 0.610 | 0.719 | | 0.789 | | | | | | | | | | | | | | | | | |
| 19 | 0.359 | 0.444 | 0.527 | 0.647 | 0.764 | | 0.838 | | | | | | | | | | | | | | | | | |
| 20 | 0.379 | 0.469 | 0.556 | 0.684 | 0.808 | | 0.888 | | | | | | | | | | | | | | | | | |
| 21.3 | | | | | | | | | 1.08 | 1.16 | | 1.28 | | 1.43 | | | | | | | | | | |
| 22 | 0.418 | 0.518 | 0.616 | 0.758 | | | 0.986 | 1.07 | | | | | | | | | | | | | | | | |
| 25 | | 0.592 | 0.704 | 0.869 | 1.03 | | 1.13 | | | 1.39 | | | | | | | | | | | | | | |
| 28 | | | 0.793 | 0.980 | 1.16 | | 1.28 | 1.40 | | 1.57 | | 1.66 | | | | | | | | | | | | |
| 30 | | 0.715 | 0.852 | 1.05 | 1.25 | | 1.38 | | | 1.70 | 1.79 | 1.88 | 2.00 | 2.11 | 2.29 | | | | | | | | | |
| 32 | | 0.764 | 0.911 | 1.13 | 1.34 | | 1.48 | | | 1.82 | 1.92 | 2.02 | 2.15 | 2.27 | 2.46 | | | | | | | | | |
| 33 | | | | | | | | | | 1.88 | | 2.09 | 2.22 | | | | | | | | | | | |
| 33.7 | | | | | | | | | | 1.92 | | 2.13 | 2.27 | | | | | | | | | | | |
| 37 | | 0.838 | | 1.24 | | | | | | | | 2.12 | | | | | | | | | | | | |
| 38 | | | 1.09 | 1.35 | 1.61 | | 1.78 | | | 2.19 | | | | | | | | | | | | | | |
| 40 | | | 1.15 | 1.42 | 1.70 | | 1.87 | 2.05 | | 2.31 | | 2.57 | 2.74 | | | | | | | | | | | |
| 42 | | | | | | | | | | 2.44 | 2.57 | 2.71 | 2.89 | 3.06 | 3.32 | 3.45 | 3.58 | 3.75 | | | | | | |
| 43 | | | | 1.54 | | | | | | | | 2.73 | | | | | | | | | | | | |
| 45 | | | 1.30 | 1.61 | 1.92 | | 2.12 | | | 2.62 | | | | | | | | | | | | | | |
| 48 | | | | 1.72 | | | | | | 2.81 | 2.96 | 3.12 | 3.33 | 3.54 | 3.84 | 3.99 | 4.14 | 4.34 | | | | | | |
| 51 | | | | 1.83 | 2.18 | | 2.42 | | | 2.99 | | | 3.55 | | | | | | | | | | | |
| 57 | | | | 2.05 | 2.45 | | 2.71 | | | 3.36 | 3.55 | 3.74 | 4.00 | 4.25 | 4.62 | 4.80 | 4.99 | 5.23 | 5.83 | 6.41 | | | | |
| 60 | | | | 2.16 | 2.58 | | 2.86 | | | 3.55 | 3.75 | 3.95 | 4.22 | 4.48 | 4.88 | 4.88 | 5.27 | 5.52 | 6.16 | 6.78 | | | | |
| 63.5 | | | | 2.29 | 2.74 | 2.89 | 3.03 | | | 3.76 | | | 4.48 | | 5.18 | | | 5.87 | | | | | | |
| 73 | | | | | | | | | | 4.35 | | 4.85 | 5.18 | 5.51 | 6.00 | | 6.48 | 6.81 | | | | | | |
| 76 | | | | 2.76 | 3.29 | | 3.65 | 4.00 | | 4.53 | | 5.05 | 5.40 | 5.75 | 6.26 | 6.51 | 6.77 | 7.10 | 7.93 | 8.75 | | | | |
| 80 | | | | 2.90 | 3.47 | 3.66 | 3.85 | 4.22 | | | | 5.33 | 5.70 | | | | | | | | | | | |
| 89 | | | | | | | 4.29 | | | 5.33 | | 5.95 | 6.36 | 6.77 | 7.38 | 7.68 | 7.98 | 8.38 | 9.38 | 10.36 | 11.33 | 12.28 | | |
| 89.3 | | | | | | | | | | | | | | | | 7.38 | | | | | | | | |
| 90 | | | | | | | | | | | | | | | | | | 8.48 | | | | | | |
| 102 | | | | | | | 4.93 | 5.41 | | 6.13 | | 6.85 | 7.32 | 7.80 | 8.50 | 8.85 | 9.20 | 9.67 | 10.82 | 11.96 | 13.09 | 14.21 | | |
| 108 | | | | | | | | | | 6.50 | | 7.26 | 7.77 | 8.27 | 9.02 | 9.39 | 9.76 | 10.26 | 11.49 | 12.70 | 13.90 | 15.09 | | |
| 114 | | | | | | | | | | 6.87 | | 7.68 | 8.21 | 8.74 | 9.54 | 9.93 | 10.33 | 10.85 | 12.15 | 13.44 | 14.72 | 15.98 | 18.47 | |
| 127 | | | | | | | | | | | | | 9.18 | 9.77 | 10.66 | 11.10 | 11.55 | 12.13 | 13.60 | 15.04 | 16.48 | 17.90 | | |
| 133 | | | | | | | | | | 8.05 | | 8.99 | 9.62 | 10.24 | 11.18 | 11.64 | 12.11 | 12.73 | 14.26 | 15.78 | 17.29 | 18.79 | | |
| 146 | | | | | | | | | | | | | 10.58 | | 12.30 | | | 14.01 | 15.71 | 17.39 | 19.06 | 20.72 | 24.00 | 27.23 |
| 152 | | | | | | | | | | | | | 11.02 | 11.74 | 12.82 | 13.35 | 13.89 | 14.60 | 16.37 | 18.13 | 19.87 | 21.60 | 25.03 | 28.41 |
| 152.4 | | | | | | | | | | | 9.79 | | 11.05 | | | | | | | | | | | |
| 159 | | | | | | | | | | 9.65 | | 10.79 | 11.54 | 12.30 | 13.42 | 13.98 | 14.52 | 15.29 | 17.15 | 18.99 | 20.82 | 22.64 | 26.24 | 26.24 |
| 168 | | | | | | | | | | | | | 12.21 | 13.01 | | | | 16.18 | 18.14 | 20.10 | 22.04 | 23.97 | 27.79 | 31.57 |
| 177.8 | | | | | | | | | | | | | | | | | | | | 21.31 | 23.27 | 25/2 | 29.49 | 33.50 |
| 193.7 | | | | | | | | | | | | | | | | | | | | 23.27 | 25.53 | 27.77 | 32.23 | 36.64 |
| 219 | | | | | | | | | | | | | | | 18.60 | | 20.17 | 21.21 | 23.80 | 26.39 | 28.96 | 31.52 | 36.60 | 41.63 |

## Welded pipes range

| Outside diameter, mm | Wall thickness, mm | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 5.0 | 5.5 | 6.0 | 7.0 | 8.0 | 9.0 | 10.0 | 11.0 | 12.0 | 13.0 |
| | Weight per meter length, kg | | | | | | | | | |
| 244.5 | 29.53 | 32.42 | 35.42 | 41.00 | 46.66 | 52.27 | | | | |
| 273 | 32.05 | 36.28 | 39.51 | 45.92 | 52.28 | 58.60 | 64.86 | | | |
| 325 | 39.46 | 43.38 | 47.20 | 54.90 | 62.54 | 70.14 | 77.68 | | | |
| 355.6 | | | 51.73 | 60.18 | 68.58 | 76.93 | 85.23 | | | |
| 377 | | | 54.90 | 63.87 | 72.80 | 81.68 | 90.51 | | | |
| 406.4 | | | 59.25 | 68.95 | 78.60 | 88.20 | 97.76 | 107.72 | 116.72 | |
| 426 | | | 62.15 | 72.33 | 82.47 | 92.55 | 102.59 | 112.58 | 122.52 | |
| 530 | | | 77.54 | 90.29 | 102.99 | 115.64 | 128.24 | 140.79 | 153.30 | 165.75 |

## Welded hollow section range

| Size, mm | Wall thickness, mm | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1.0 | 1.2 | 1.5 | 1.8 | 2.0 | 2.2 | 2.5 | 2.8 | 3.0 | 3.2 | 3.5 | 3.8 | 4.0 | 4.2 | 4.5 | 5.0 | 7.0 | 8.0 | 9.0 | 10.0 |
| | Weight per meter length, kg | | | | | | | | | | | | | | | | | | | |
| 15 x 15 | 0.426 | 0.501 | 0.605 | | | | | | | | | | | | | | | | | |
| 20 x 20 | 0.583 | 0.689 | 0.841 | 0.985 | 1.08 | | | | | | | | | | | | | | | |
| 25 x 25 | 0.740 | 0.877 | 1.07 | 1.27 | 1.39 | 1.48 | 1.68 | 1.79 | 1.95 | | | | | | | | | | | |
| 28 x 25* | | | 1.15 | 1.33 | 1.49 | 1.58 | 1.80 | | 2.09 | | | | | | | | | | | |
| 30 x 15 | 0.661 | 0.783 | 0.959 | 1.13 | 1.23 | | | | | | | | | | | | | | | |
| 30 x 20 | 0.740 | 0.877 | 1.08 | 1.27 | 1.39 | | | | | | | | | | | | | | | |
| 30 x 30 | 0.897 | 1.07 | 1.31 | 1.55 | 1.70 | | | | | | | | | | | | | | | |
| 35 x 15 | 0.740 | 0.877 | 1.08 | 1.13 | 1.39 | | | | | | | | | | | | | | | |
| 40 x 20 | 0.897 | 1.07 | 1.31 | 1.55 | 1.70 | | 2.07 | | | | | | | | | | | | | |
| 40 x 25 | | 1.16 | 1.43 | 1.69 | 1.86 | 2.00 | 2.27 | 2.45 | 2.66 | 2.81 | 3.02 | | | | | | | | | |
| 40 x 28 | | | 1.50 | 1.78 | 1.95 | 2.13 | 2.39 | 2.64 | 2.80 | 2.96 | 3.19 | | | | | | | | | |
| 40 x 40 | | 1.44 | 1.78 | 2.12 | 2.33 | 2.51 | 2.85 | 3.11 | 3.36 | 3.49 | 3.85 | 4.03 | 4.30 | 4.36 | 4.61 | | | | | |
| 50 x 20 | | 1.25 | 1.55 | 1.83 | 2.02 | 2.20 | 2.47 | | | | | | | | | | | | | |
| 50 x 25* | | 1.35 | 1.67 | 1.97 | 2.17 | 2.37 | 2.66 | 2.94 | 3.13 | 3.31 | 3.57 | | | | | | | | | |
| 50 x 30 | | | | | | | 2.86 | 3.11 | 3.36 | 3.49 | 3.85 | 4.03 | 4.30 | 4.36 | 4.61 | | | | | |
| 50 x 50 | | | | | 2.96 | 3.24 | 3.64 | 3.99 | 4.31 | 4.50 | 4.94 | 5.22 | 5.56 | 5.68 | 6.02 | | | | | |
| 60 x 40 | | | 2.02 | 2.40 | 2.65 | 2.89 | 3.25 | 3.60 | 3.83 | 4.06 | 4.40 | 4.72 | 4.93 | | | | | | | |
| 60 x 60 | | | | | 2.96 | 3.24 | 3.64 | 3.99 | 4.31 | 4.50 | 4.94 | 5.22 | 5.56 | 5.68 | 6.02 | | | | | |
| 80 x 60 | | | | | 3.59 | 3.93 | 4.43 | 4.87 | 5.25 | 5.50 | 6.04 | 6.41 | 6.82 | | | | | | | |
| 100 x 100 | | | | | 3.59 | 3.93 | 4.43 | 4.87 | 5.25 | 5.50 | 6.04 | 6.41 | 6.82 | | | | | | | |
| 120 x 80 | | | | | | | 5.17 | 5.75 | 6.13 | 6.50 | 7.14 | 7.61 | 8.07 | 8.32 | 8.85 | | | | | |
| 120 x 120 | | | | | | | | | 7.07 | 7.51 | 8.16 | 8.80 | 9.22 | 9.64 | 10.26 | 11.27 | | | | |
| 140 x 100 | | | | | | | | | 8.96 | 9.52 | 10.36 | 11.19 | 11.73 | 12.28 | 13.08 | 14.41 | | | | |
| 150 x 100 | | | | | | | | | 8.01 | 8.51 | 9.26 | 9.99 | 10.48 | 10.96 | 11.67 | 12.84 | | | | |
| 160 x 80 | | | | | | | | | 8.96 | 9.52 | 10.36 | 11.19 | 11.73 | 12.28 | 13.08 | 14.41 | | | | |
| 180 x 180 | | | | | | | | | 10.84 | 11.53 | 12.56 | 13.57 | 14.25 | 14.91 | 15.91 | 17.55 | | | | |
| 200 x 160 | | | | | | | | | 8.96 | 9.52 | 10.36 | 11.19 | 11.73 | 12.28 | 13.08 | 14.41 | | | | |
| 200 x 200 | | | | | | | | | 10.84 | 11.53 | 12.56 | 13.57 | 14.25 | 14.91 | 15.91 | 17.55 | | | | |
| 250 x 150 | | | | | | | | | 11.31 | 12.03 | 13.10 | 14.17 | 14.87 | 15.57 | 16.62 | 18.33 | | | | |
| 240 x 160 | | | | | | | | | 10.84 | 11.53 | 12.56 | 13.57 | 14.25 | 14.91 | 15.91 | 17.55 | | | | |
| 350 x 250 | | | | | | | | | | | | | | | | | 36.70 | 41.48 | 46.14 | 50.68 |
| | | | | | | | | | | | | | | | | | 36.70 | 41.48 | 46.14 | 50.68 |
| | | | | | | | | | | | | | | | | | 41.10 | 46.51 | 51.79 | 56.96 |
| | | | | | | | | | | | | | | | | | 41.10 | 46.51 | 51.79 | 56.96 |
| | | | | | | | | | | | | | | | | | 41.10 | 46.51 | 51.79 | 56.96 |
| | | | | | | | | | | | | | | | | | 63.08 | 71.63 | 80.05 | 88.36 |

## Standard galvanized welded pipes range

| Outside diameter, mm | Wall thickness, mm | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2.0 | 2.2 | 2.5 | 2.8 | 3.0 | 3.2 | 3.5 | 3.8 | 4.0 | 4.5 | 5.0 | 6.0 |
| | Weight per meter length, kg | | | | | | | | | | | |
| 33 | | | 1.94 | 2.15 | 2.29 | | | | | | | |
| 33.7 | | | 1.98 | 2.19 | 2.34 | | | | | | | |
| 35 | | | | 2.18 | | | | | | | | |
| 38 | 1.83 | | 2.25 | | | | | | | | | |
| 40 | 1.93 | | 2.38 | 2.65 | 2.82 | | | | | | | |
| 42 | | | 2.51 | 2.79 | 2.98 | | | | | | | |
| 43 | | | | 2.81 | | | | | | | | |
| 45 | 2.18 | | 2.70 | | | | | | | | | |
| 48 | | | 2.89 | 3.21 | 3.43 | 3.65 | 3.96 | | 4.47 | | | |
| 51 | 2.49 | | 3.08 | | 3.66 | | | | | | | |
| 57 | 2.79 | | 3.46 | 3.85 | 4.11 | 4.38 | 4.76 | | 5.39 | 6.00 | | |
| 60 | 2.95 | | 3.66 | 4.07 | 4.35 | 4.61 | 5.03 | 5.43 | 5.69 | | | |
| 63.5 | 3.12 | | 3.87 | | 4.61 | | 5.34 | | 6.05 | | | |
| 73* | | | 4.48 | 5.00 | 5.34 | 5.68 | 6.18 | 6.67 | 7.01 | | | |
| 76 | 3.76 | 4.12 | 4.67 | 5.20 | 5.56 | 5.92 | 6.45 | 6.97 | 7.31 | 8.17 | 9.01 | |
| 80 | 3.97 | 4.35 | | 5.49 | 5.87 | | | | | | | |
| 89 | 4.42 | | 5.49 | 6.13 | 6.55 | 6.97 | 7.60 | 8.22 | 8.63 | 9.66 | 10.67 | |
| 90 | | | | | | | | | 8.73 | | | |
| 102 | 5.08 | 5.57 | 6.31 | 7.06 | 7.54 | 8.03 | 8.76 | 9.48 | 9.96 | 11.14 | 12.32 | 14.64 |
| 108 | | | 6.70 | 7.48 | 8.00 | 8.52 | 9.29 | 10.05 | 10.57 | 11.83 | 13.08 | 15.54 |
| 114 | | | 7.08 | 7.91 | 8.46 | 9.00 | 9.82 | 10.64 | 11.18 | 12.51 | 13.84 | 16.46 |
| 127 | | | | | 9.46 | | 10.98 | | 12.49 | 14.01 | 15.49 | 18.44 |
| 133 | | | 8.29 | 9.26 | 9.91 | 10.55 | 11.52 | 12.47 | 13.11 | 14.69 | 16.25 | |
| 146 | | | | | 10.90 | | 12.67 | | 14.43 | 16.18 | 17.91 | 21.34 |
| 152 | | | | | 11.35 | 12.09 | | | 15.04 | | | 22.25 |
| 159 | | | 9.94 | 11.11 | 11.89 | 12.67 | 13.82 | 14.96 | 15.75 | 17.66 | 19.56 | 23.32 |

## Welded water and gas line pipes as per GOST 3262-75

| Nominal bore | Outside diameter, mm | Wall thickness, mm | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1.8 | 2.0 | 2.2 | 2.35 | 2.50 | 2.8 | 3.0 | 3.2 | 3.5 | 4.0 | 4.5 | 5.0 | 5.5 |
| | | Weight per meter length, kg | | | | | | | | | | | | |
| 6 | 10.2 | 0.37 | 0.40 | | | 0.47 | | | | | | | | |
| 8 | 13.5 | | 0.57 | 0.61 | | | 0.74 | | | | | | | |
| 10 | 16.0 | | 0.69 | | | | | | | | | | | |
| 10 | 17.0 | | 0.74 | 0.80 | | | 0.98 | | | | | | | |
| 15 | 20.0 | | | | | 1.08 | | | | | | | | |
| 15 | 21.3 | | | | 1.10 | 1.16 | 1.28 | 1.35 | 1.43 | | | | | |
| 20 | 26.0 | | | | | 1.45 | | | | | | | | |
| 20 | 26.8 | | | | 1.42 | 1.50 | 1.66 | 1.76 | 1.86 | | | | | |
| 25 | 32.0 | | | | | | 2.02 | | | | | | | |
| 25 | 33.5 | | | | | 1.91 | 2.12 | 2.26 | 2.39 | 2.59 | 2.91 | | | |
| 32 | 41.0 | | | | | | 2.64 | | | | | | | |
| 32 | 42.3 | | | | | 2.45 | 2.73 | 2.91 | 3.09 | 3.35 | 3.78 | | | |
| 40 | 47.0 | | | | | | | 3.26 | | | | | | |
| 40 | 48.0 | | | | | 2.74 | 3.05 | 3.33 | 3.46 | 3.84 | 4.34 | | | |
| 50 | 59.0 | | | | | | | 4.14 | | | | | | |
| 50 | 60.0 | | | | | 3.48 | 3.88 | 4.22 | 4.40 | 4.88 | 5.43 | 6.16 | | |
| 65 | 74.0 | | | | | | | | 5.59 | | | | | |
| 65 | 75.5 | | | | | | | | 5.71 | 6.21 | 7.05 | 7.88 | | |
| 80 | 88.5 | | | | | | | | | 7.34 | 8.34 | 9.32 | | |
| 90 | 101.3 | | | | | | | | | 8.44 | 9.60 | 10.74 | | |
| 100 | 114.0 | | | | | | | | | | 10.85 | 12.15 | 13.44 | |
| 125 | 140.0 | | | | | | | | | | 13.42 | 15.04 | 13.44 | 18.24 |
| 150 | 165.0 | | | | | | | | | | 15.88 | 17.81 | | 21.63 |

Light. standard and extra strong.

At the customer's request.

## Mechanical properties of welded pipes as per GOST 10705-80

| Steel grade | Ultimate tensile strength $\sigma_u$, N/mm² (kgf/mm²) for pipes outside diameter D, mm | | | | | Yield strength, $\sigma_y$, N/mm² (kgf/mm²) | | Elongation $\delta_5$, % for pipes outside diameter D, mm | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 8-19 | 20 to 60 for wall thickness | | 63-152 | 159-245 | | | 8-19 | 20 to 60 for wall thickness | | 63-152 | 159-245 | |
| | | greater than 0.06 D | 0.06 D or less | | | 8-152 | 159-245 | | greater than 0.06 D | 0.06 D or less | | greater than 0.06 D | 0.06 D or less |
| 08Yu | 314 (32) | 314 (32) | 294 (30) | – | – | 174 (18) | – | 7 | 7 | 16 | – | – | – |
| 08PS.08KP | 372 (38) | 372 (38) | 314 (32) | 294 (30) | 314 (32) | 174 (18) | 196 (20) | 6 | 6 | 15 | 23 | 15 | 18 |
| 08 | 372 (38) | 372 (38) | 314 (32) | 294 (30) | 314 (32) | 186 (19) | 196(20) | 6 | 6 | 15 | 23 | 15 | 18 |
| 10KP. ST2KP | 372 (38) | 372 (38) | 333 (34) | 314 (32) | 314 (32) | 174 (18) | 196(20) | 6 | 6 | 15 | 23 | 15 | 18 |
| 10PS | 372 (38) | 372 (38) | 333 (34) | 314 (32) | 314 (32) | 186 (19) | 196(20) | 6 | 6 | 15 | 23 | 15 | 18 |
| St2ps | 372 (38) | 372 (38) | 333 (34) | 314 (32) | 333 (34) | 186 (19) | 206 (21) | 6 | 6 | 15 | 23 | 15 | 17 |
| 10 | 372 (38) | 372 (38) | 333 (34) | 314 (32) | 314 (32) | 196 (20) | 196(20) | 6 | 6 | 15 | 23 | 15 | 18 |
| St2sp | 372 (38) | 372 (38) | 333 (34) | 314 (32) | 333 (34) | 196 (20) | 206 (21) | 6 | 6 | 15 | 23 | 14 | 17 |
| 15 | 441 (45) | 441 (45) | 372 (38) | 353 (36) | 353 (36) | 206 (21) | 216 (22) | 5 | 5 | 14 | 21 | 14 | 17 |
| 20 | 441 (45) | 441 (45) | 372 (38) | 353 (36) | 353 (36) | 216 (22) | 216 (22) | 5 | 5 | 14 | 21 | 14 | 17 |
| St3kp | 441 (45) | 441 (45) | 392 (40) | 372 (38) | 353 (36) | 196 (20) | 216 (22) | 5 | 5 | 13 | 20 | 14 | 17 |
| St3ps | 441 (45) | 441 (45) | 392 (40) | 372 (38) | 353 (36) | 206 (21) | 216 (22) | 5 | 5 | 13 | 20 | 14 | 17 |
| St3sp | 441 (45) | 441 (45) | 392 (40) | 372 (38) | 353 (36) | 216 (22) | 216 (22) | 5 | 5 | 13 | 20 | 14 | 17 |

# PRECISION PIPES

Pipes for the manufacture of machine parts in the automotive, drilling, oil production, mining, crane, and other industries, including the manufacture of electric submersible pump housings, hydraulic cylinders, shock absorbers, as well as cardan shafts

MANUFACTURERS

VTZ, SinTZ, TMK-INOX, PNTZ, CHTPZ

**FEATURES**

Precision steel pipes are manufactured with higher accuracy. Pipes are produced by hot or cold rolling (on cold pilgers), or by drawing (with or without a plug). Pipes meet different requirements for dimensions, steel grades, manufacturing tolerances, mechanical properties, and surface quality, depending on the production technique and the requirements of applicable standards.

Pipes are made of carbon, alloy and stainless steels to Russian and foreign standards as well as to manufacturer's specifications designed to meet the technical requirements of specific customers.

Mandatory tests and examinations are performed in full compliance with applicable standards.

Pipes can be made to customer specifications for dimensions and tolerances, including improved precision of wall thickness (+/-6%) and outside diameter (+/-0.5%), as well as extremely thick-walled pipes with a D/S ratio of up to 2.2 mm and a wall thickness of up to 67 mm. Isothermal annealing and outside surface machining services are available.

Random length pipes are manufactured with lengths between 1.5 m and 12.5 m; cut length pipes – between 4.5 mm and 9 m. Cut length pipes may be produced with a length up to 14.5 m by agreement between the parties.

TMK-INOX produces high-tech cold-formed pipes made of stainless steels and alloys with controlled nanostructure and improved properties to meet the current and future requirements of various industries. Available equipment can produce pipes with diameters from 1.5 mm to 102 mm, wall thickness from 0.12 mm to 10 mm and length up to 30 m. The plant can produce pipes with a high quality of inner and outer surfaces, including electrochemical polishing.

**SPECIAL CAPABILITIES**

- Cold-formed pipe diameter range: 0.8 mm–426 mm; wall thickness: 0.16 mm–24.0 mm
- Manufacture of pipes with non-standard dimensions and tolerances
- Outer surface grinding
- Pipe heat treatment in furnaces with oxidizing or non-oxidizing atmospheres
- Manufacture of capillary tubes
- Nondestructive testing, hydraulic and pneumatic testing of pipes
- Protective coating of pipes

## Standards

| Standards | Pipes dimensions | | Steel grade |
|---|---|---|---|
| | Outside diameter, mm | Wall thickness, mm | |
| 1 | 2 | 3 | 4 |
| DIN EN 10305-1<br>Steel tubes for precision applications. Technical delivery conditions. Seamless cold drawn tubes | 6.0-110.0 | 0.5-10.0 | E235; E355; C45E |
| | 95-300 | 7.5-25 | |
| DIN 2391<br>Seamless precision steel tubes | 32-100* | 2.5-8.0 | St 35; St 45; St 52.0; St 52.3 |
| DIN 2393-94<br>Welded precision steel tubes (cold-formed)<br>(DIN EN 10305-2 Steel tubes for precision applications) | By agreement with the customer | | RSt 34-2; RSt 37-2; St 44-2 |
| DIN 2394<br>As-welded and sized precision steel tubes<br>EN 10305-3<br>Steel tubes for precision applications. Welded cold sized tubes | 12-63.5 | 0.8-3.0 | RSt 34-2; RSt 37-2; St 44-2; E195; E235; E275; E355 |
| DIN 2395, part 1, 2<br>Rectangular and square welded precision steel tubes (for general use)<br>EN 10305-5<br>Steel tubes for precision applications. Technical delivery conditions. Welded cold sized square and rectangular tubes | 15x15-60x40 | 1.0-3.0 | RSt 34-2; RSt 37-2; St 44-2 |
| GOST 9567-75<br>Precision steel tubes | 5.0-80.0<br>70-203 | 0.5-10.0<br>9-50 | 10; 20; 35; 45; 15KhM; 3OKhGSA; 10G2; etc. |
| | 5.0-426 | 0.8-40 | |
| TU 14-159-263-2006 (TU 14-159-292-2005)<br>Cold-formed electric-welded precision steel pipes for the automotive industry | 16-58 | 1.0-2.5 | 10; 10ps; 10kp; 20; 08; 08kp; 08ps; 09G2S |
| 1 | 2 | 3 | 4 |

# STAINLESS STEEL PIPES

Corrosion-resistant pipes are used in the machine building, chemical, oil refining, and food industries

MANUFACTURERS

VTZ, TMK-INOX, CHTPZ

**FEATURES**

Hot-formed stainless steel pipes are produced at Volzhsky Pipe Plant by extrusion. Two extrusion lines with 2,000-tonne and 5,500-tonne extruders have no analogues in Russia and can manufacture pipes with diameters from 42 mm to 273 mm, wall thicknesses from 3.5 mm to 30 mm and lengths from 2 m to 12.5 m, with a high quality of inner and outer surfaces. The mechanical properties of produced pipes are close to those of cold-formed pipes and have improved performance characteristics compared to rolled pipes. The employed production method allows making pipes of steel grades, that are hardly formable, such as 06KhN28MDT, 10KhN28MDT, 10Kh17N13M2T, 15Kh25T, 20-30Kh13, as well as 10Kh23N18 creep resistant steel grades and 08Kh22N6T duplex steel grades.

TMK-INOX produces high-tech cold-formed pipes made of stainless steels and alloys with controlled nanostructure and improved properties to meet current and future requirements of various industries. Available equipment can produce pipes with diameters from 1.5 mm to 102 mm, wall thicknesses from 0.12 mm to 10 mm and lengths up to 30 m. The plant can produce pipes with a high quality of inner and outer surfaces, including electrochemical polishing.

Hot-formed stainless steel pipes are produced at Chelyabinsk Pipe Plant on pilger mills. These mills are unique in that they can produce pipes with a diameter up to 630 mm. Pipes are supplied after machining to ensure high surface quality.

Cold-formed stainless steel pipes are produced at Chelyabinsk Pipe Plant on cold pilgers. These mills can produce pipes with diameters from 90 mm to 426 mm and wall thicknesses from 2 mm to 40 mm. CHTPZ is the only manufacturer of cold-formed pipes with diameters over 120 mm in Russia and other CIS countries.

Before shipment to the customer, pipes undergo finishing and quality control at the manufacturer's facilities.

## Standards

| Standards | Pipes dimensions | | Steel grade |
|---|---|---|---|
| | Outside diameter, mm | Wall thickness, mm | |
| 1 | 2 | 3 | 4 |
| ASTM A 312/A 312M<br>Standard Specification for Seamless and Welded Austenitic Stainless Steel Pipes | 42.16-219.1 | 0.4-28 | TP304; TP304L; TP316; TP316L; TP316TI; TP321; TP 304H; TP 347; TP 347H |
| DIN EN 10216-5 (DIN 17458)<br>Seamless steel tubes for pressure purposes. Technical delivery conditions. Stainless steel tubes | 6-219.1<br>42-273 | 0.8-28<br>4-30 | 1.4501; 1.4307; 1.4571; 1.4401; 1.4404; 1.4306; 1.4435; X6CrNiTil81 |
| GOST 9940-81<br>Seamless hot formed tubes made of corrosion resistant steel | 42-273 | 3-36 | 08-40Kh13; 08-12Kh18N10T; 08-10Kh17N13M2T; 10-20Kh23N18; 06Kh28MDT; 08Kh22N6T; 08-12Kh17; 15Kh25T; 08Kh17N15M3T; 03Kh17N14M3 and other grades by agreement |
| GOST 9941-81<br>Seamless cold- and warm-formed tubes of corrosion-resistant steel | 5-426 | 0.2-40 | 08Kh13; 12Kh13; 20Kh13; 12Kh17; 12Kh17T; 08-12Kh18N10T; 10Kh17N13M2T; 06KhN28MDT; 10Kh23 N 18; 08Kh2 2 N6T |
| GOST 10498-82<br>Especially thin-walled seamless tubes of corrosion-resistant steel | 4-75 | 0.2-1.0 | 06Kh18NYuT; 08Kh18NYuT; 09Kh18NYuT |
| GOST 14162-79<br>Steel tubes of small dimensions (capillary) | 2-6 | 0.2-1.6 | 12Kh18N9; 08Kh18N1 OT; 12Kh18N10T; 08Kh18N12T; 12Kh18N12T; KhN78T |
| GOST 19277-73<br>Seamless steel tubes for oil and fuel lines | 4-70 | 0.5-1.0 | 12Kh18N10T; 08Kh18N10T; 08Kh18N10T-VD; 12Kh18N10T-VD |
| GOST 22897-86<br>Seamless cold-formed pipes from alloys based on titanium | 6-89 | 0.5-8 | VT1-0; PT-1M; PT-7M |
| 1 | 2 | 3 | 4 |

## Range of cold-formed stainless steel pipes

| Outside diameter, mm | Wall thickness, mm | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.8 | 1.0 | 1.2 | 1.4 | 1.5 | 1.8 | 2.0 | 2.2 | 2.5 | 2.6 | 3.0 | 3.2 | 3.5 | 4.0 | 4.5 | 5.0 | 5.5 | 6.0 | 6.5 | 7.0 | 7.5 | 8.0 | 9.0 | 10.0 |
| 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 13 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 14 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 15 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 17 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 18 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 19 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 21 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 22 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 23 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 24 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 27 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 28 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 32 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 34 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 36 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 38 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 42 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 45 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 48 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 50 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 51 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 53 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 54 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 56 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 57 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 60 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 63 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 68 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 73 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 76 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 83 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 85 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 89 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 95 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 100 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 102 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

The table shows the length of cut-length pipes as per GOST 9941-81.

## Range of hot-finished stainless steel pipes

| Outside diameter, mm | Wall thickness, mm | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 3.5 | 4 | 4.5 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 22 | 25 | 28 | 30 |
| | Weight per meter length, kg | | | | | | | | | | | | | | | | | | | | | | |
| 42 | 3.34 | 3.77 | 4.19 | 4.59 | 5.36 | 6.08 | 6.75 | 7.37 | 7.94 | 8.46 | | | | | | | | | | | | | |
| 45 | 3.60 | 4.07 | 4.52 | 4.96 | 5.81 | 6.60 | 7.35 | 8.04 | 8.69 | 9.28 | 9.83 | | | | | | | | | | | | |
| 48 | 3.87 | 4.37 | 4.86 | 5.34 | 6.25 | 7.12 | 7.94 | 8.71 | 9.43 | 10.10 | 10.72 | 11.29 | 11.81 | | | | | | | | | | |
| 50 | 4.04 | 4.57 | 5.08 | 5.58 | 6.55 | 7.47 | 8.34 | 9.16 | 9.93 | 10.65 | 11.32 | 11.94 | 12.51 | 13.03 | | | | | | | | | |
| 53 | 4.30 | 4.86 | 5.42 | 5.96 | 7.00 | 7.99 | 8.93 | 9.83 | 10.67 | 11.47 | 12.21 | 12.91 | 13.55 | 14.15 | 14.69 | | | | | | | | |
| 54 | 4.39 | 4.96 | 5.53 | 6.08 | 7.15 | 8.17 | 9.13 | 10.05 | 10.92 | 11.74 | 12.51 | 13.23 | 13.90 | 14.52 | 15.09 | | | | | | | | |
| 57 | 4.65 | 5.26 | 5.86 | 6.45 | 7.59 | 8.69 | 9.73 | 10.72 | 11.66 | 12.56 | 13.40 | 14.20 | 14.94 | 15.64 | 16.28 | | | | | | | | |
| 60 | 4.91 | 5.56 | 6.20 | 6.83 | 8.04 | 9.21 | 10.32 | 11.39 | 12.41 | 13.38 | 14.30 | 15.16 | 15.98 | 16.75 | 17.47 | | | | | | | | |
| 68 | 5.60 | 6.35 | 7.09 | 7.82 | 9.23 | 10.60 | 11.91 | 13.18 | 14.39 | 15.56 | 16.68 | 17.75 | 18.76 | 19.73 | 20.65 | 21.52 | 22.34 | 23.11 | 23.83 | | | | |
| 73 | 6.04 | 6.85 | 7.65 | 8.44 | 9.98 | 11.47 | 12.91 | 14.30 | 15.64 | 16.93 | 18.17 | 19.36 | 20.50 | 21.59 | 22.63 | 23.63 | 24.57 | 25.46 | | | | | |
| 76 | 6.30 | 7.15 | 7.99 | 8.81 | 10.42 | 11.99 | 13.50 | 14.97 | 16.38 | 17.75 | 19.06 | 20.33 | 21.54 | 22.71 | 23.83 | 24.89 | 25.91 | | | | | | |
| 83 | 6.91 | 7.84 | 8.77 | 9.68 | 11.47 | 13.20 | 14.89 | 16.53 | 18.12 | 19.66 | 21.15 | 22.58 | 23.97 | 25.31 | 26.61 | 27.85 | | | | | | | |
| 89 | 7.43 | 8.44 | 9.44 | 10.42 | 12.36 | 14.25 | 16.08 | 17.87 | 19.61 | 21.29 | 22.93 | 24.52 | 26.06 | 27.55 | 28.99 | 30.38 | 31.72 | 33.01 | 34.25 | | | | |
| 95 | | 9.03 | 10.11 | 11.17 | 13.25 | 15.29 | 17.27 | 19.21 | 21.10 | 22.93 | 24.72 | 26.46 | 28.14 | 29.78 | 31.37 | 32.91 | | | | | | | |
| 102 | | 9.73 | 10.89 | 12.04 | 14.30 | 16.50 | 18.66 | 20.77 | 22.83 | 24.84 | 26.80 | 28.72 | 30.58 | 32.39 | 34.15 | 35.86 | 37.53 | 39.14 | 40.70 | 43.68 | | | |
| 108 | | 10.32 | 11.56 | 12.78 | 15.19 | 17.55 | 19.85 | 22.11 | 24.32 | 26.48 | 28.59 | 30.65 | 32.66 | 34.62 | 36.53 | 38.39 | 40.21 | 41.97 | 43.68 | 46.96 | | | |
| 114 | | | | 13.53 | 16.08 | 18.59 | 21.05 | 23.45 | 25.81 | 28.12 | 30.38 | 32.59 | 34.75 | 36.86 | 38.92 | 40.93 | 42.89 | 44.80 | 46.66 | 50.23 | 55.22 | | |
| 121 | | | | 14.39 | 17.12 | 19.81 | 22.44 | 25.02 | 27.55 | 30.03 | 32.46 | 34.85 | 37.18 | 39.46 | 41.70 | 43.88 | 46.01 | 48.10 | 50.13 | 54.05 | 59.56 | 64.63 | |
| 127 | | | | | 18.02 | 20.85 | 23.63 | 26.36 | 29.04 | 31.67 | 34.25 | 36.78 | 39.26 | 41.70 | 44.08 | 46.41 | 48.69 | 50.93 | 53.11 | 57.33 | 63.29 | 68.80 | |
| 133 | | | 14.35 | 15.88 | 18.91 | 21.89 | 24.82 | 27.70 | 30.53 | 33.31 | 36.04 | 38.72 | 41.35 | 43.93 | 46.46 | 48.94 | 51.37 | 53.76 | 56.09 | 60.61 | 67.01 | 72.97 | |
| 140 | | | | | 19.95 | 23.11 | 26.21 | 29.26 | 32.26 | 35.22 | 38.12 | 40.98 | 43.78 | 46.53 | 49.24 | 51.90 | 54.50 | 57.06 | 59.56 | 64.43 | 71.35 | 77.83 | |
| 146 | | | | | 20.85 | 24.15 | 27.40 | 30.60 | 33.75 | 36.86 | 39.91 | 42.91 | 45.86 | 48.77 | 51.62 | 54.43 | 57.18 | 59.89 | 62.54 | 67.71 | 75.08 | 82.00 | |
| 152 | | | | | 21.74 | 25.19 | 28.59 | 31.94 | 35.24 | 38.49 | 41.70 | 44.85 | 47.95 | 51.00 | 54.01 | 56.96 | 59.86 | 62.72 | 65.52 | 70.98 | 78.80 | 86.17 | 90.84 |
| 159 | | | 17.26 | 19.11 | 22.78 | 26.41 | 29.98 | 33.51 | 36.98 | 40.40 | 43.78 | 47.11 | 50.38 | 53.61 | 56.78 | 59.91 | 62.99 | 66.02 | 69.00 | 74.80 | 83.14 | 91.03 | |
| 168 | | | | | 24.12 | 27.97 | 31.77 | 35.52 | 39.21 | 42.86 | 46.46 | 50.01 | 53.51 | 56.96 | 60.36 | 63.71 | 67.01 | 70.26 | 73.46 | 79.72 | 88.73 | 97.29 | 102.75 |
| 180 | | | | | | | 34.15 | 38.20 | 42.19 | 46.14 | 50.03 | 53.88 | 57.68 | 61.43 | 65.12 | 68.77 | 72.37 | 75.92 | 79.42 | 86.27 | 96.17 | 105.63 | 111.68 |
| 194 | | | | | | | 36.93 | 41.32 | 45.67 | 49.96 | 54.20 | 58.40 | 62.54 | 66.64 | 70.68 | 74.68 | 78.63 | 82.52 | 86.37 | 93.91 | 104.86 | 115.36 | |
| 219 | | | | | | 36.83 | 41.89 | 46.91 | 51.87 | 56.78 | 61.65 | 66.46 | 71.23 | 75.94 | 80.61 | 85.23 | 89.79 | 94.31 | 98.78 | 107.56 | 120.37 | 132.73 | |
| 245 | | | | | | | | 52.71 | 58.32 | 63.88 | 69.39 | 74.85 | 80.26 | 85.62 | 90.94 | 96.20 | 101.41 | 106.57 | 111.68 | 121.76 | 136.50 | 150.80 | |
| 273 | | | | | | | 52.62 | 58.97 | 65.27 | 71.53 | 77.73 | 83.89 | 89.99 | 96.05 | 102.05 | 108.01 | 113.92 | 119.77 | 125.58 | | | | |

Pipes can be ordered to dimensions not specified in the table.

* Pipes is delivered under an additional technical agreement. The table shows weight per meter length of pipes made of 08Kh18N10T steel.

## Mechanical properties of seamless standard pipes as per GOST 9940-81, GOST 9941-81

| Steel grade | Ultimate tensile strength $\sigma_u$, kgf/mm$^2$ (N/mm$^2$) | | Elongation $\delta_5$, % | | Density, ρ, g/cm$^3$ | |
|---|---|---|---|---|---|---|
| | Hot-formed | Cold-formed | Hot-formed | Cold-formed | Hot-formed | Cold-formed |
| 08Kh13 | 372 (38) | 372 (38) | 22 | 22 | 7.70 | 7.70 |
| 08Kh17T | 372 (38) | 372 (38) | 17 | 17 | 7.70 | 7.70 |
| 12Kh13 | 392 (40) | 392 (40) | 21 | 22 | 7.70 | 7.70 |
| 12Kh17 | 441 (45) | 441 (45) | 17 | 17 | 7.70 | 7.70 |
| 15Kh25T | 441 (45) | 461 (47) | 17 | 17 | 7.60 | 7.60 |
| 04Kh18N10 | 441 (45) | 490 (50) | 40 | 45 | 7.90 | 7.90 |
| 10Kh23N18 | 491 (50) | 529 (54) | 37 | 35 | 7.95 | 7.95 |
| 08Kh17N15M3T | 510 (52) | 549 (56) | 35 | 35 | 8.10 | 8.10 |
| 08Kh18N10 | 510 (52) | 529 (54) | 40 | 37 | 7.90 | 7.90 |
| 08Kh18N10T | 510 (52) | 529 (56) | 40 | 37 | 7.90 | 7.90 |
| 08Kh18N10T | 510 (52) | 549 (56) | 38 | 37 | 7.90 | 7.90 |
| 08Kh18N12B | 510 (52) | 529 (54) | 40 | 37 | 7.90 | 7.90 |
| 08Kh18N12T | 510 (52) | 549 (56) | 40 | 37 | 8.10 | 7.95 |
| 08Kh20N14C2 | 510 (52) | 510 (52) | 35 | 35 | 7.70 | 7.70 |
| 10Kh17N13M2T | 529 (54) | 529 (54) | 35 | 35 | 8.00 | 8.00 |
| 12Kh18N9 | 529 (54) | 549 (56) | 40 | 37 | 7.90 | 7.90 |
| 12Kh18N10T | 529 (54) | 549 (56) | 40 | 35 | 7.90 | 7.95 |
| 12Kh18N12T | 529 (54) | 549 (56) | 40 | 35 | 7.95 | 7.90 |
| 17Kh18N9 | 568 (58) | 568 (58) | 40 | 35 | 7.90 | 7.90 |
| 08Kh22N6T | 588 (60) | 588 (60) | 24 | 20 | 7.70 | 7.60 |
| 08KhN28MDT | 490 (50) | 490 (50) | 30 | 30 | 7.96 | 7.96 |

# PETROLEUM CRACKING PIPES

This type of pipes is used in petroleum cracking and chemical synthesis units

MANUFACTURERS

VTZ, SinTZ, TAGMET, CHTPZ, PNTZ

**FEATURES**

Cold-formed pipe petroleum cracking pipes are produced at Sinarsky Pipe Plant (SinTZ) from billets supplied from steel mills or from semi-finished hot-extruded pipes produced by Volzhsky Pipe Plant.

Hot-formed petroleum cracking pipes are produced at Volzhsky and Sinarsky Pipe Plants from billets supplied from steel mills or from continuous cast billets made by the Company.

Cracking pipe length varies from 4 m to 12.1 m. In agreement with the customer, petroleum cracking pipes can be manufactured with lengths over 12.1 meters.

**Volzhsky Pipe Plant makes pipes by hot extrusion. Research identified the following advantages of this method over conventional hot rolling*:**

- Pressure loss per unit of nominal length in pipeline made from extruded pipes is 40% less than in pipeline made from rolled pipes
- Pipes made by hot extrusion have higher average strength (by 5%–7%) and ductility (by 10%–14%) than rolled pipes, the probability of extruded pipe failure is five times less than in case of rolled pipes

Hot-formed petroleum cracking pipes are produced at Chelyabinsk Pipe Plant in pilger mills from forged billets. These mills are unique in that they can extruded pipe with a diameter up to 550 mm.

## Standards

| Standards | Pipes dimensions | | Steel grade | Pipes type |
|---|---|---|---|---|
| | Outside diameter, mm | Wall thickness, mm | | |
| GOST 550-2020<br>Seamless steel tubes for petroleum processing and petrochemical industry | 10-1088 | 1.5-12.0 | 10; 10G2; 20; 15Kh5M; 12Kh8 | cold-finished |
| | 32-168<br>273-426 | 2.8-16.0<br>7.0-18.0 | 10; 20<br>10G2; 13Kh9M1 | hot-finished |
| | 38-245 | 4.0-32.0 | 10; 20; 10G2;12KhM; 12Kh8; 15Kh5MLZKh9M | hot-finished |
| TU 14-3R-62-2001<br>Seamless hot-formed pipes made of 15Kh5M steel for the oil refining industry | 273-426 | 10-36 | 15Kh5M | hot-finished |
| | 550 | 25 | | |

## Range of cold-finished petroleum cracking pipes

| Outside diameter, mm | Wall thickness, mm | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1.5 | 2.0 | 2.5 | 3.0 | 3.5 | 4.0 | 4.5 | 5 | 5.5 | 6 |
| | Weight per meter length, kg | | | | | | | | | |
| 19 | 0.65 | 0.84 | | | | | | | | |
| 20 | | 0.89 | 1.08 | | | | | | | |
| 25 | | 1.13 | 1.39 | 1.63 | | | | | | |
| 32 | | | | | | | | | | |
| 38 | | 1.78 | 2.19 | 2.59 | 2.98 | | | | | |
| 48 | | | | | | 4.34 | 4.83 | | | |

* Based on the results of tests conducted by TMK Group.

## Range of seamless hot-finished petroleum cracking pipes

| Outside diameter, mm | Wall thickness, mm | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2.8 | 3.0 | 3.2 | 3.5 | 4.0 | 4.5 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 14 | 15 | 16 | 17 | 18 | 20 | 22 | 23 | 25 | 28 | 30 |
| | Weight per meter length, kg | | | | | | | | | | | | | | | | | | | | | | | | |
| 32 | – | – | – | – | – | – | | | | | | | | | | | | | | | | | | | |
| 33.7 | – | – | – | – | – | – | | | | | | | | | | | | | | | | | | | |
| 38 | – | – | – | – | – | – | – | | | | | | | | | | | | | | | | | | |
| 42 | – | – | – | – | 3.75 | 4.16 | 4.56 | 5.33 | 6.04 | 6.71 | 7.32 | 7.89 | 8.41 | 8.88 | 9.67 | | | | | | | | | | |
| 42.4 | – | – | – | – | – | | | | | | | | | | | | | | | | | | | | |
| 45 | | – | – | – | 4.04 | 4.49 | 4.93 | 5.77 | 6.56 | 7.30 | 7.99 | 8.63 | 9.22 | 9.77 | 10.70 | | | | | | | | | | |
| 48.3 | | – | – | – | 4.34 | 4.83 | 5.30 | 6.21 | 7.08 | 7.89 | 8.66 | 9.37 | 10.04 | 10.65 | 11.74 | | | | | | | | | | |
| 50 | | – | – | – | 4.54 | 5.05 | 5.55 | 6.51 | 7.42 | 8.29 | 9.10 | 9.86 | 10.58 | 11.24 | 12.43 | 12.95 | | | | | | | | | |
| 54 | | | – | – | 4.93 | 5.49 | 6.04 | 7.10 | 8.11 | 9.08 | 9.99 | 10.85 | 11.67 | 12.43 | 13.81 | 14.43 | 14.99 | 15.51 | | | | | | | |
| 57 | | | | | 5.23 | 5.83 | 6.41 | 7.55 | 8.63 | 9.67 | 10.65 | 11.59 | 12.48 | 13.32 | 14.85 | 15.54 | 16.18 | 16.77 | 17.31 | | | | | | |
| 60 | | | – | – | 5.52 | 6.16 | 6.78 | 7.99 | 9.15 | 10.26 | 11.32 | 12.33 | 13.29 | 14.20 | 15.88 | 16.65 | 17.36 | 18.03 | 18.64 | 19.73 | | | | | |
| 60.3 | | | – | – | – | | | | | | | | | | | | | | | | | | | | |
| 63.5 | | | | – | 5.87 | 6.55 | 7.21 | 8.51 | 9.75 | 10.95 | 12.10 | 13.19 | 14.24 | 15.24 | 17.09 | 17.94 | 18.74 | 19.49 | 20.20 | 21.45 | | | | | |
| 68 | | | | – | – | 7.05 | 7.77 | 9.17 | 10.53 | 11.84 | 13.09 | 14.30 | 15.46 | 16.57 | 18.64 | 19.61 | 20.52 | 21.38 | 22.19 | 23.67 | | | | | |
| 70 | | | – | – | – | 7.27 | 8.01 | 9.47 | 10.88 | 12.23 | 13.54 | 14.80 | 16.00 | 17.16 | 19.33 | 20.35 | 21.31 | 22.22 | 23.08 | 24.66 | | | | | |
| 73 | | | | – | – | 7.60 | 8.38 | 9.91 | 11.39 | 12.82 | 14.20 | 15.54 | 16.82 | 18.05 | 20.37 | 21.46 | 22.49 | 23.18 | 24.41 | 26.14 | | | | | |
| 76 | | | | – | – | 7.93 | 8.75 | 10.36 | 11.91 | 13.42 | 14.87 | 16.28 | 17.63 | 18.94 | 21.40 | 22.57 | 23.67 | 24.74 | 25.75 | 27.62 | | | | | |
| 83 | | | | | – | 8.71 | 9.62 | 11.39 | 13.12 | 14.80 | 16.42 | 18.00 | 19.53 | 21.01 | 23.82 | 25.16 | 26.44 | 27.66 | 28.85 | 31.07 | | | | | |
| 89 | | | | – | – | 9.38 | 10.36 | 12.28 | 14.15 | 15.98 | 17.76 | 19.48 | 21.16 | 22.79 | 25.89 | 27.37 | 28.80 | 30.19 | 31.52 | 34.03 | 35.21 | | | | |
| 95 | | | | | | | 11.10 | 13.17 | 15.19 | 17.16 | 19.09 | 20.96 | 22.79 | 24.56 | 27.96 | 29.59 | 31.17 | 32.70 | 34.18 | 36.99 | | | | | |
| 102 | | | | | | | 11.96 | 14.20 | 16.40 | 18.54 | 20.64 | 22.69 | 24.68 | 26.63 | 30.38 | 32.18 | 33.93 | 35.64 | 37.29 | 40.44 | 41.95 | 43.40 | 47.47 | 51.10 | 53.27 |
| 108 | | | | | | | 12.70 | 15.09 | 17.43 | 19.73 | 21.97 | 24.17 | 26.31 | 28.41 | 32.45 | 34.40 | 36.30 | 38.15 | 39.95 | 43.40 | 45.05 | 46.66 | 51.17 | 55.24 | 57.70 |
| 114 | | | | | | | 13.44 | 15.98 | 18.47 | 20.91 | 23.30 | 25.65 | 27.94 | 30.18 | 34.52 | 36.62 | 38.67 | 40.67 | 42.61 | 46.36 | 48.16 | 49.91 | 54.87 | 59.38 | 62.14 |
| 121 | | | | | | | 14.30 | 17.02 | 19.68 | 22.29 | 24.86 | 27.37 | 29.84 | 32.26 | 36.94 | 39.21 | 41.43 | 43.60 | 45.72 | 49.81 | 51.79 | 53.71 | 59.18 | 64.21 | 67.32 |
| 127 | | | | | | | 15.04 | 17.90 | 20.71 | 23.48 | 26.19 | 28.85 | 31.47 | 34.03 | 39.01 | 41.43 | 43.80 | 46.12 | 48.38 | 52.77 | 54.89 | 56.96 | 62.88 | 68.36 | 71.77 |
| 133 | | | | | | | 15.78 | 18.79 | 21.75 | 24.66 | 27.52 | 30.33 | 33.09 | 35.81 | 41.08 | 43.65 | 46.16 | 48.63 | 51.05 | 55.73 | 58.00 | 60.22 | 66.58 | 72.50 | 76.20 |
| 140 | | | | | | | – | 19.83 | 22.96 | 26.04 | 29.07 | 32.06 | 34.99 | 37.88 | 43.50 | 46.24 | 48.93 | 51.57 | 54.15 | 59.18 | 61.63 | 64.02 | 70.90 | 77.33 | 81.38 |
| 146 | | | | | | | – | 20.71 | 23.99 | 27.22 | 30/41 | 33.54 | 36.62 | 39.65 | 45.57 | 48.46 | 51.29 | 54.08 | 56.82 | 62.14 | 64.73 | 67.27 | 74.60 | 81.48 | 85.82 |
| 152 | | | | | | | – | 21.60 | 25.03 | 28.41 | 31.74 | 35.02 | 38.25 | 41.43 | 47.64 | 50.68 | 53.66 | 56.60 | 59.48 | 65.10 | 67.84 | 70.53 | 78.30 | 85.62 | 90.26 |
| 159 | | | | | | | – | 22.64 | 26.24 | 29.79 | 33.29 | 36.74 | 40.15 | 43.50 | 50.06 | 53.27 | 56.42 | 59.53 | 62.59 | 68.55 | 71.46 | 74.33 | 82.61 | 90.45 | 95.44 |
| 168 | | | | | | | – | | 27.79 | 31.56 | 35.29 | 38.96 | 42.59 | 46.16 | 53.17 | 56.60 | 59.97 | 63.31 | 66.58 | 72.99 | 76.13 | 79.21 | 88.16 | 96.67 | 102.10 |
| 180 | | | | | | | | | 29.87 | 33.93 | 37.95 | 41.92 | 45.84 | 49.71 | 57.31 | 61.04 | 64.71 | 68.34 | 71.91 | 78.91 | 82.34 | 85.72 | 95.56 | 104.95 | 110.98 |
| 194 | | | | | | | | | | 36.69 | 41.06 | 45.37 | 49.64 | 53.86 | 62.14 | 66.22 | 70.23 | 74.21 | 78.12 | 85.82 | 89.59 | 93.31 | 104.19 | 114.62 | 121.34 |
| 203 | | | | | | | | | | 38.47 | 43.06 | 47.59 | 52.08 | 56.52 | 65.25 | 69.55 | 73.78 | 77.98 | 82.12 | 90.26 | 94.25 | 98.20 | 109.74 | 120.83 | 127.99 |
| 219 | | | | | | | | | 36.60 | 41.63 | 46.61 | 51.54 | 56/42 | 61.26 | 70.77 | 75.46 | 80.10 | 84.69 | 89.22 | 98.15 | 102.54 | 106.88 | 119.60 | 131.88 | 139.83 |
| 245 | | | | | | | | | | | | | | | 79.76 | 85.08 | 90.36 | 95.59 | 100.76 | 110.97 | 116.00 | 120.98 | 135.63 | 149.83 | 159.07 |

## Mechanical properties of petroleum cracking pipes

| Steel grade | Ultimate tensile strength $\sigma_u$, kgf/mm² (MN/m²) | Yield strength, $\sigma_y$, kgf/mm² (MN/m²) | Elongation δ, % | Percentage reduction of area, ψ, % | Impact strength KCU, J/cm² (kgf/cm²) | Hardness, HB |
|---|---|---|---|---|---|---|
| | min | | | | | max |
| COLD-FORMED | | | | | | |
| 10 | 34 (333) | 21 (206) | 26 | – | – | 137 |
| 20 | 42 (412) | 25 (245) | 23 | – | – | 156 |
| 15Kh5M | 40 (392) | 22 (216) | 22 | – | – | 170 |
| 12Kh8 | 40 (392) | 22 (216) | 22 | – | – | 170 |
| 10G2* | 43 (421) | 27 (265) | 21 | – | – | 197 |
| HOT-FORMED | | | | | | |
| 10 | 36 (353) | 22 (216) | 25 | 50 | 78(8) | 137 |
| 20 | 44 (431) | 26 (255) | 22 | 50 | 78(8) | 156 |
| 10G2 | 43 (421) | 27 (265) | 21 | 50 | 118 (12) | 197 |
| 12KhM | 42 (412) | 25 (245) | 21 | 45 | 69 (7) | 156 |
| 13Kh9M1 | 392 | 216 | 22 | 50 | 98 | 197 |
| | 569** | 412** | 16** | 50** | 98** | 235** |
| 15Kh5 | 40 (392) | 22 (216) | 24 | 50 | 98 (10) | 170 |
| 15Kh5M | 40 (392) | 22 (216) | 22 | 50 | 118 (12) | 170 |
| 15Kh5M-U (normalization and tempering) | 60 (588) | 42 (412) | 16 | 65 | 98 (10) | 235 |

* For steel grade 10G2, percentage reduction of area is 50%, impact strength is 118 (12) as per GOST 550-75.

** Afternormalization and tempering if requested by customer.

# PIPES FOR POWER GENERATION

Power-generation pipes are used in steam boilers and pipelines with high and supercritical steam parameters

MANUFACTURERS

VTZ, SinTZ, TAGMET, PNTZ, CHTPZ

**FEATURES**

Cold-formed pipes for power generation are produced at Sinarsky Pipe Plant from billets supplied from steel mills or from semi-finished hot-extruded pipes produced by Volzhsky Pipe Plant. Pipe length: up to 24 m.

Hot-formed pipes for power generation produced at Volzhsky and Sinarsky Pipe Plants from billets supplied from steel mills or from continuous cast billets.

Hot-formed pipes for power generation are manufactured at Volzhsky Pipe Plant by hot extrusion.

**Research identified the following advantages of this method over conventional hot rolling*:**

- Pipes made by hot extrusion have higher average strength (by 5%–7%) and ductility (by 10%–14%) than rolled pipes, the probability of extruded pipe failure is five times less than in case of rolled pipes

Hot-formed pipes for power generation are produced at Chelyabinsk Pipe Plant on pilger mills. These mills are unique in that they can produce pipes with a wall thickness up to 90 mm.

Cold-formed pipes for power generation are produced at Chelyabinsk Pipe Plant on cold pilgers. These mills can produce pipes with diameters from 90 mm to 426 mm and wall thicknesses from 2 mm to 40 mm. CHTPZ is the only manufacturer of cold-formed pipes with diameters over 120 mm in Russia and other CIS countries.

* Based on the results of tests conducted by TMK Group.

## Standards

| Standards | Pipes dimensions | | Steel grade |
|---|---|---|---|
| | Outside diameter. mm | Wall thickness. mm | |
| 1 | 2 | 3 | 4 |
| ASTM A53/A53M<br>Standard Specification for Seamless Carbon Steel Pipes for High-Temperature Service | 168.3-406.4 | 7.1-34.9 | A; B; C |
| | 10.3-88.9 | 1.73-11.13 | |
| | 10.3-73.0* | 1.73-10.15 | Gr A; Gr B; Gr C |
| ASTM A106/A106M<br>Standard Specification for Pipes, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless<br>ASME SA-53/SA-53M<br>Specification for Pipes, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless<br>ASME SA-106/SA-106M<br>Standard Specification for Seamless Carbon Steel Pipes for High-Temperature Service | 33.4-219.1 | 2.90-25.40 | |
| ASTM A106/A106M<br>Standard Specification for Seamless Carbon Steel Pipes for High-Temperature Service | 10.3-127 | 1.73-12.7 | A-1; C |
| | 10.3-73.0** | 1.73-10.15 | Gr A; Gr B; Gr C |
| | 33.4-219.1 | 2.90-25.40 | |
| | 60.3-406.4 | 4-34.9 | A-1; C |
| ASTM A192/A192M<br>Standard Specification for Seamless Carbon Steel Boiler Tubes for High-Pressure Service | 19.05-76.2 | 2.11-5.0 | Low carbon |
| ASME SA-192/SA-192M<br>Seamless Carbon Steel Boiler Tubes for High-Pressure Service. Specifications | 19.05* | 2.11 | |
| ASTM A335/A335M<br>Seamless Ferritic Alloy-Steel Pipes for High-Temperature Service | 26.7-406.4 | 2.11-25.4 | P5; P9; P11; P12; T11; T12; P22; P91; etc. |
| | 219.1 | 8.18-27.79 | |
| ASTM A 213/A213M<br>Standard Specification for Seamless Ferritic and Austenitic Alloy-Steel Boiler, Superheater, and Heat-Exchanger Tubes Specifications | 26.7-60.3 | 2.11-5.54 | T5 |
| | 48-127; 141.3 | 4-12.7 | |
| ASME SA-213/SA-213M<br>Standard Specification for Seamless Ferritic and Austenitic Alloy-Steel Boiler, Superheater, and Heat-Exchanger Tubes | 31.75** | 6.1-6.6 | T22 |
| DIN EN 10216-1<br>Seamless steel tubes for pressure purposes. Technical delivery conditions. Non-alloy steel tubes with specified room temperature properties | 10.2-168.3 | 1.6-16 | P235TR1; P235TR2; 34CrMo4 to DIN EN 10297-1 (up to 76.1 mm) |
| | 10.2-88.9** | 1.8-7.1 | P195TR1; P195TR2; P235TR1 P235TR2; P265TR1; P265TR2 |
| | 32-219 | 2.9-45.0 | |
| | 38.0-426.0 | 6-32 | P235TR1; P235TR2; 34CrMo4 to DIN EN 10297-1 (up to 76.1 mm) |
| DIN EN 10216-2 (DIN 17175)<br>Seamless steel tubes for pressure purposes. Technical delivery conditions. Non-alloy and alloy steel tubes with specified elevated temperature properties | 13.5-88.9** | 1.8-12.0 | P235GH; 16Mo3; 13CrMo4-5; 10CrMo9-10 |
| | 21.3-245.9 | 2.9-55.0 | P195GH; P235GH; P265GH; 16MoZ; 13CrMo4-5 |
| DIN EN 10216-3<br>Seamless steel tubes for pressure purposes. Technical delivery conditions. Alloy fine grain steel tubes | 33.7-168.3 | 2.9-16 | P355N; P355NH |
| | 32.0-219.1 | 2.9-40.0 | P355N |
| GOST 33229-2015<br>Tubes for boiler and heat exchanging equipment. Technical specifications. Part 1. Seamless steel pipes to work under pressure not more than 6,4 MPa and at temperatures not exceeding 400°C | 6-168 | 0.8-16 | 10; 20; 09G2S; 10G2 |
| | 10-180** | 2.5-12.0 | 10; 20; 09G2S; 10G2 |
| TU 14-ZR-55-2001<br>Seamless steel pipes for steam boilers and pipelines | 10-76** | 2.0-10.0 | 20; 15GS; 20PV; 15KhM; 12Kh1MF; 12Kh18N12T; 15Kh1M1F |
| | 38-245 | 3.0-40.0 | |
| | 42-273 | 4.0-50.0 | |
| | 102-159 | 6.0-16.0 | 20; 12Kh1MF |
| | 168 | 6.5-16.0 | |
| | 194; 219 | 7.0-16.0 | |
| | 219 | 8.0-30.0 | |
| | 219-426 | 8.0-30.0 | |
| | 219-550 | 10-90 | 20; 15KhM; 12Kh1MF; 15GS; 15Kh1M1F |
| 1 | 2 | 3 | 4 |

* Dimensions of pipes for power generation to TU 14-3-190-2004 comply with GOST 8732-78 and GOST 8734-75.

** Pipes are manufactured in a cold-formed condition.

## Mechanical properties

| Steel grade | Yield strength, $\sigma_{0,2}$ kgf/mm² (MN/m²) at a test temperature of, °C | | | Long-term strength, N/mm² (kgf/mm²) at a test temperature of, °C and a test time of, h | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 250 | 400 | 450 | 450 | | 500 | | 550 | | 600 | | 650 | | |
| | | | | $10^5$ h | $2x10^5$ h | $10^5$ h | $2x10^5$ h | $10^5$ h | $2x10^5$ h | $10^5$ h | $2x10^5$ h | $10^5$ h | $2x10^5$ h | $10^5$ h |
| 20 | 196 (20) | 137 (14) | 127 (13) | 78 (8.0) | 56 (5.7) | 38 (3.9) | – | – | – | – | – | – | – | – |
| 15GS | 245 (25) | 167 (17) | 127 (13) | 98 (10.0) | 56 (5.7) | – | – | – | – | – | – | – | – | – |
| 15KhM | 225 (23) | 196 (20) | 191 (19.5) | – | – | 127 (13.0) | 118 (11.5) | 51 (5.2) | 38 (3.9) | – | – | – | – | – |
| 12Kh1MF | – | 216 (22) | 206 (21) | – | – | 167 (17.0) | 135 (13.8) | 97 (9.9) | 82 (8.4) | 55 (5.6) | 45 (4.6) | – | – | – |
| 15Kh1M1F | – | 235 (24) | 225 (23) | – | – | 176 (18.0) | 147 (15.0) | 104 (10.6) | 93 (9.5) | 63 (6.4) | 56 (5.7) | – | – | – |
| 12Kh18N12T | – | – | – | – | – | – | – | 147 (15.0) | 135 (13.8) | 108 (11.0) | 90 (9.9) | 69 (7.0) | 61 (6.2) | 29 (3.0) |
| 16Mo3 | 205 (20.5) | 160 (16) | 155 (15.5) | 245 (24.5) | 228 (22.8) | 93 (9.3) | 75 (7.5) | 31 (3.1) | 25 (2.5) | – | – | – | – | – |
| 13CrMo41-5 | 230 (23) | 190 (19) | 180 (18) | 285 (28.5) | 260 (26) | 137 (13.7) | 115 (11.5) | 49 (4.9) | 39 (3.9) | – | – | – | – | – |
| St 35.8 | 160* (16) | 110 (11) | 105 (10.5) | 69 (7) | 57 (5.7) | – | – | – | – | – | – | – | – | – |
| St 45.8 | 180 (18) | 130 (13) | 125 (12.5) | 69 (7) | 57 (5.7) | – | – | – | – | – | – | – | – | – |

* These values are guaranteed.

## Mechanical properties of power-generation pipes metal

| Steel grade | Test piece orientation | Ultimate tensile strength $\sigma_{0,2}$, MN/mm² (kgf/mm²) | Yield strength $\sigma_{0,2}$, MN/mm², (kgf/mm²) | Elongation δ, % | Percentage reduction of area, ψ, % | Hardness, HB | Impact strength KCU, J/cm² (kgf/cm²) |
|---|---|---|---|---|---|---|---|
| | | min | | | | | |
| 20 | longitudinal | 412-549 (42-56) | 216 (22) | 24 | 45 | – | 49 (5) |
| | transverse | 412-549 (42-56) | 216 (22) | 22 | 40 | – | 39 (4) |
| 15GS | longitudinal | at least 490 (50) | 294 (30) | 18 | 45 | – | 59 (6) |
| | transverse | at least 490 (50) | 294 (30) | 16 | 40 | – | 49 (5) |
| 15KhM | longitudinal | 441-637 (45-65) | 235 (24) | 21 | 50 | – | 59 (6) |
| | transverse | 441-637 (45-65) | 225 (23) | 20 | 45 | – | 49 (5) |
| 12Kh1MF | longitudinal | 441-637 (45-65) | 274 (28) | 21 | 55 | – | 59 (6) |
| | transverse | 441-637 (45-65) | 274 (28) | 19 | 50 | – | 49 (5) |
| 15Kh1M1F | longitudinal | 490-686 (50-70) | 314 (32) | 18 | 50 | – | 49 (5) |
| | transverse | 490-686 (50-70) | 314 (32) | 16 | 45 | – | 39 (4) |
| 12Kh18N12T | longitudinal | 539-686 (55-70) | 216-392 (22-40) | 35 | 55 | 190 | – |
| | transverse | – | – | – | – | – | – |
| 16Mo3 | longitudinal | 450-600 (45-60) | 260-270 (26-27) | 22 | – | – | – |
| | transverse | 450-600 (45-60) | 260-270 (26-27) | 20 | – | – | 34 (3) |
| 13CrM 041-5 | longitudinal | 440-590 (44-59) | 280-290 (28-29) | 22 | – | – | – |
| | transverse | 440-590 (44-59) | 280-290 (28-29) | 20 | – | – | 34 (3) |
| St 35.8 | longitudinal | 360-480 | at least 235 | 25 | – | – | – |
| | transverse | 360-480 | at least 235 | 23 | – | – | 34 (3) |
| St 45.8 | longitudinal | 410-530 | 235-25 | 21 | – | – | – |
| | transverse | 410-530 | 235-25 | 19 | – | – | 27 (3) |
| P235GH | longitudinal | 360-500 | at least 235 | 25 | – | – | 40 28 |
| | transverse | 360-500 | at least 235 | 23 | – | – | 27 |
| A | longitudinal | 330 | 205 | 28 | – | – | – |
| B | longitudinal | 415 | 240 | 22 | – | – | – |
| C | longitudinal | 485 | 275 | 20 | – | – | – |
| A-1 | longitudinal | 415 | 255 | 30 | – | – | – |
| Low carbon | longitudinal | 325 (47) | 180 (26) | 35 | – | – | – |

## Range of seamless pipes made of carbon and alloy steel

| Outside diameter, mm | Wall thickness, mm | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2.0 | 2.5 | 3.0 | 3.5 | 4.0 | 4.5 | 5.0 | 5.5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 14 | 16 | 18 | 20 | 22 | 24 | 28 | 30 | 32 | 36 |
| | Weight per meter length, kg | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | 0.39 | 0.46 | | | | | | | | | | | | | | | | | | | | | | | |
| 12 | 0.49 | 0.59 | 0.67 | | | | | | | | | | | | | | | | | | | | | | |
| 16 | 0.69 | 0.83 | 0.96 | 1.08 | 1.18 | | | | | | | | | | | | | | | | | | | | |
| 20 | 0.89 | 1.08 | 1.26 | 1.42 | 1.58 | 1.72 | 1.85 | | | | | | | | | | | | | | | | | | |
| 22 | 0.99 | 1.20 | 1.41 | 1.60 | 1.78 | 1.94 | 2.10 | | | | | | | | | | | | | | | | | | |
| 25 | 1.13 | 1.39 | 1.63 | 1.86 | 2.07 | 2.28 | 2.47 | 2.64 | 2.81 | | | | | | | | | | | | | | | | |
| 28 | 1.28 | 1.57 | 1.85 | 2.11 | 2.37 | 2.61 | 2.84 | 3.05 | 3.26 | | | | | | | | | | | | | | | | |
| 30 | 1.38 | 1.70 | 2.00 | 2.29 | 2.56 | 2.83 | 3.08 | 3.32 | 3.55 | | | | | | | | | | | | | | | | |
| 32 | 1.48 | 1.82 | 2.15 | 2.46 | 2.76 | 3.05 | 3.33 | 3.59 | 3.85 | 4.32 | | | | | | | | | | | | | | | |
| 36 | 1.68 | 2.07 | 2.44 | 2.81 | 3.16 | 3.50 | 3.82 | 4.14 | 4.44 | 5.01 | | | | | | | | | | | | | | | |
| 38 | 1.78 | 2.19 | 2.59 | 2.98 | 3.35 | 3.72 | 4.07 | 4.41 | 4.74 | 5.35 | | | | | | | | | | | | | | | |
| 40 | | 2.31 | 2.74 | 3.15 | 3.55 | 3.94 | 4.32 | 4.68 | 5.03 | | | | | | | | | | | | | | | | |
| 42 | | 2.44 | 2.89 | 3.32 | 3.75 | 4.16 | 4.56 | 4.95 | 5.33 | 6.04 | 6.71 | 7.32 | 7.89 | 8.41 | | | | | | | | | | | |
| 45 | | 2.62 | 3.11 | 3.58 | 4.04 | 4.49 | 4.93 | 5.36 | 5.77 | 6.56 | 7.30 | 7.99 | 8.63 | 9.22 | | | | | | | | | | | |
| 50 | | 2.93 | 3.48 | 4.01 | 4.54 | 5.05 | 5.55 | 6.04 | 6.51 | 7.42 | 8.29 | 9.10 | 9.86 | 10.58 | | | | | | | | | | | |
| 57 | | | | | 5.35 | 5.96 | 6.56 | 7.15 | 7.71 | 8.81 | 9.87 | 10.87 | 11.82 | 12.71 | 13.56 | 15.17 | 16.53 | 17.69 | | | | | | | |
| 60 | | | | | 5.65 | 6.30 | 6.94 | 7.56 | 8.17 | 9.35 | 10.47 | 11.55 | 12.58 | 13.55 | 14.47 | 16.23 | 17.74 | 19.05 | 20.16 | | | | | | |
| 76 | | | | | | 8.12 | 8.96 | 9.78 | 10.59 | 12.18 | 13.71 | 15.19 | 16.62 | 18.00 | 19.32 | 21.82 | 24.10 | 26.18 | 28.06 | | | | | | |
| 83 | | | | | | 8.92 | 9.84 | 10.75 | 11.65 | 13.42 | 15.12 | 16.78 | 18.39 | 19.94 | 21.44 | 24.29 | 26.93 | 29.37 | 31.59 | 33.82 | | | | | |
| 89 | | | | | | | 10.60 | 11.59 | 12.56 | 14.48 | 16.33 | 18.15 | 19.90 | 21.61 | 23.26 | 26.42 | 29.36 | 32.10 | 34.64 | 37.14 | 39.31 | | | | |
| 102 | | | | | | | 12.24 | 13.39 | 14.54 | 16.78 | 18.97 | 21.10 | 23.19 | 25.22 | 27.21 | 31.02 | 34.62 | 38.01 | 41.20 | 44.18 | 47.17 | 52.21 | 54.43 | | |
| 108 | | | | | | | 13.00 | 14.22 | 15.45 | 17.84 | 20.18 | 22.47 | 24.71 | 26.89 | 29.03 | 33.14 | 37.04 | 40.74 | 44.23 | 47.52 | 50.59 | 56.45 | 58.97 | | |
| 114 | | | | | | | 14.40 | 15.06 | 17.11 | 19.76 | 22.35 | 24.89 | 27.37 | 29.79 | 32.16 | 36.72 | 41.06 | 45.16 | 49.04 | 52.69 | 56.12 | 60.68 | 63.50 | | |
| 121 | | | | | | | 15.32 | 16.03 | 18.22 | 21.06 | 23.84 | 26.56 | 29.23 | 31.84 | 34.39 | 39.32 | 44.08 | 48.50 | 52.75 | 56.78 | 60.57 | 65.62 | 68.80 | 70.24 | |
| 133 | | | | | | | | | 20.13 | 23.28 | 26.38 | 29.42 | 32.41 | 35.34 | 38.20 | 43.77 | 49.12 | 54.23 | 59.12 | 63.77 | 68.20 | 76.38 | 80.12 | 83.64 | 89.99 |
| 140 | | | | | | | | | 21.24 | 24.58 | 27.87 | 31.09 | 34.26 | 37.38 | 40.43 | 46.37 | 52.08 | 57.57 | 62.83 | 67.86 | 72.66 | 81.58 | 85.69 | 89.58 | 96.67 |
| 146 | | | | | | | | | 22.20 | 25.70 | 29.14 | 32.52 | 35.85 | 39.13 | 42.34 | 48.60 | 54.63 | 60.48 | 66.01 | 71.36 | 76.47 | 86.03 | 90.46 | 94.67 | 102.40 |
| 152 | | | | | | | | | 23.15 | 26.81 | 30.41 | 33.96 | 37.44 | 40.88 | 44.25 | 50.83 | 57.18 | 63.30 | 69.19 | 74.85 | 80.29 | 90.48 | 95.24 | 99.76 | 108.13 |
| 159 | | | | | | | | | 24.26 | 28.11 | 31.90 | 35.63 | 39.30 | 42.92 | 46.48 | 53.42 | 60.14 | 66.64 | 72.90 | 78.94 | 84.74 | 95.68 | 100.80 | 105.70 | |
| 168 | | | | | | | | | | 29.78 | 33.80 | 37.77 | 41.69 | 45.54 | 49.34 | 56.76 | 63.96 | 70.98 | 77.67 | 84.19 | 90.47 | 102.36 | 107.96 | 113.33 | 123.40 |
| 194 | | | | | | | | | | 34.60 | 39.32 | 43.98 | 48.58 | 53.12 | 57.61 | 66.41 | 74.99 | 83.34 | 91.46 | 99.35 | 107.01 | 121.66 | 128.64 | 135.39 | 148.21 |
| 219 | | | | | | | | | | | 44.62 | 49.94 | 55.21 | 60.41 | 65.56 | 75.69 | 85.59 | 95.27 | 104.71 | 113.93 | 122.92 | 140.21 | 148.52 | 156.60 | 172.07 |
| 245 | | | | | | | | | | | 47.78 | 56.14 | 62.10 | 67.99 | 73.83 | 85.34 | 96.62 | 107.67 | 118.50 | 129.09 | 139.46 | 159.51 | 169.20 | | |
| 273* | | | | | | | | | | | 52.28 | 58.60 | 64.86 | 71.07 | 77.24 | 89.42 | 101.41 | 113.20 | 124.79 | 136.18 | 147.38 | | | | |
| 325* | | | | | | | | | | | | 70.14 | 77.68 | 85.18 | 92.63 | 107.38 | 121.93 | 136.28 | 150.44 | 164.39 | 178.15 | | | | |
| 426* | | | | | | | | | | | | | 102.59 | 112.58 | 122.52 | 142.25 | 161.78 | 181.11 | 200.25 | 219.19 | 237.93 | | | | |

* Pipes manufactured by agreement.

Cold-formed pipes for high pressure boilers

Hot-formed pipes for high pressure boilers

## Range of seamless high alloy steel pipes for power generation (as per TU 14-ZR-55-2001)

| Outside diameter, mm | Wall thickness, mm | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2.0 | 2.5 | 3.0 | 3.5 | 4.0 | 4.5 | 5.0 | 5.5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 14 | 15 | 16 | 18 | 20 | 22 | 25 | 26 | 28 |
| | Weight per meter length, kg | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | 0.39 | 0.46 | | | | | | | | | | | | | | | | | | | | | | |
| 12 | 0.49 | 0.59 | 0.67 | | | | | | | | | | | | | | | | | | | | | |
| 16 | 0.69 | 0.83 | 0.96 | 1.08 | 1.18 | | | | | | | | | | | | | | | | | | | |
| 20 | 0.89 | 1.08 | 1.26 | 1.42 | 1.58 | 1.72 | 1.85 | | | | | | | | | | | | | | | | | |
| 22 | 0.99 | 1.20 | 1.41 | 1.60 | 1.78 | 1.94 | 2.10 | | | | | | | | | | | | | | | | | |
| 25 | 1.13 | 1.39 | 1.63 | 1.86 | 2.07 | 2.28 | 2/47 | 2.64 | 2.81 | | | | | | | | | | | | | | | |
| 28 | 1.28 | 1.57 | 1.85 | 2.11 | 2.37 | 2.61 | 2.84 | 3.05 | 3.26 | | | | | | | | | | | | | | | |
| 30 | 1.38 | 1.70 | 2.00 | 2.29 | 2.56 | 2.83 | 3.08 | 3.32 | 3.55 | | | | | | | | | | | | | | | |
| 32 | 1.48 | 1.82 | 2.15 | 2.46 | 2.76 | 3.05 | 3.33 | 3.59 | 3.85 | 4.32 | | | | | | | | | | | | | | |
| 36 | 1.68 | 2.07 | 2.44 | 2.81 | 3.16 | 3.50 | 3.82 | 4.14 | 4.44 | 5.01 | | | | | | | | | | | | | | |
| 38 | 1.78 | 2.19 | 2.59 | 2.98 | 3.35 | 3.72 | 4.07 | 4.41 | 4.74 | 5.35 | | | | | | | | | | | | | | |
| 40 | | 2.31 | 2.74 | 3.15 | 3.55 | 3.94 | 4.32 | 4.68 | 5.03 | | | | | | | | | | | | | | | |
| 42 | | 2.44 | 2.89 | 3.32 | 3.75 | 4.16 | 4.56 | 4.95 | 5.33 | 6.04 | 6.71 | | | | | | | | | | | | | |
| 45 | | 2.62 | 3.11 | 3.58 | 4.04 | 4.49 | 4.93 | 5.36 | 5.77 | | | | | | | | | | | | | | | |
| 50 | | 2.93 | 3.48 | 4.01 | 4.54 | 5.05 | 5.55 | 6.04 | 6.51 | | | | | | | | | | | | | | | |
| 57 | | | | | 5.35 | 5.96 | 6.56 | 7.15 | 7.71 | 8.81 | 9.87 | 10.87 | 11.82 | 12.71 | 13.56 | 15.17 | 16.53 | 17.69 | | | | | | |
| 60 | | | | | 5.65 | 6.30 | 6.94 | 7.56 | 8.17 | 9.35 | 10.47 | 11.55 | 12.58 | 13.55 | 14.47 | 16.23 | 17.74 | 19.05 | 20.16 | | | | | |
| 76 | | | | | | 8.22 | 9.07 | 9.91 | 10.73 | 12.33 | 13.88 | 15.38 | 16.83 | 18.22 | 19.56 | | | | | | | | | |
| 83 | | | | | | 9.03 | 9.96 | 10.90 | 11.8 | 13.58 | 15.32 | 16.99 | 18.62 | 20.19 | 21.71 | 24.6 | 25.96 | | | | | | | |
| 89 | | | | | | 9.72 | 10.73 | 11.74 | 12.72 | 14.66 | 16.54 | 18.38 | 20.16 | 21.88 | 23.56 | 26.75 | 28.26 | | | | | | | |
| 102 | | | | | | | 12.4 | 13.57 | 14.72 | 16.99 | 19.21 | 21.37 | 23.48 | 25.54 | 27.55 | 31.41 | 33.26 | 35.05 | 38.49 | 40.72 | | | | |
| 108 | | | | | | | 13.17 | 14/41 | 15.64 | 18.06 | 20.43 | 22.75 | 25.02 | 27.23 | 29.39 | 33.56 | 35.56 | 37.51 | 41.26 | 44.79 | | | | |
| 114 | | | | | | | 13.93 | 15.25 | 16.56 | 19.14 | 21.66 | 24.13 | 26.55 | 28.92 | 31.24 | 35.71 | 37.86 | 39.97 | 44.02 | 47.86 | 51.49 | | | |
| 121 | | | | | | | 14.83 | 16.24 | 17.64 | 20.39 | 23.1 | 25.75 | 28.35 | 30.89 | 33.39 | 39.21 | 40.55 | 42.83 | 47.24 | 51.44 | 55.43 | 61.03 | 62.78 | |
| 133 | | | | | | | 16.36 | 17.93 | 19.48 | 22.54 | 25.55 | 28.51 | 31.42 | 34.27 | 37.07 | 42.51 | 45.16 | 47.75 | 52.77 | 57.59 | 62.19 | 68.70 | 70.77 | 74.74 |
| 140 | | | | | | | | | 20.55 | 23.8 | 26.99 | 30.12 | 33.21 | 36.24 | 39.22 | 45.02 | 47.84 | 50.62 | 56 | 61.17 | 66.13 | 73.18 | 75.43 | 79.76 |
| 146 | | | | | | | | | 22.48 | 26.02 | 29.51 | 32.93 | 36.3 | 39.62 | 42.87 | 49.21 | 52.29 | 55.32 | 61.19 | 66.84 | 72.25 | 79.94 | 82.39 | 87.11 |
| 152 | | | | | | | | | 23.44 | 27.15 | 30.79 | 34.38 | 37.92 | 41.39 | 44.81 | 51.47 | 54.71 | 57.89 | 64.09 | 70.06 | 75.8 | 83.97 | 86.58 | 91.62 |
| 159 | | | | | | | | | 24.57 | 28.46 | 32.3 | 36.07 | 39.79 | 43.46 | 47.06 | 54.1 | 57.53 | 60.9 | 67/47 | 73.82 | 79.93 | 88.66 | 91.46 | 96.88 |
| 168 | | | | | | | | | | 29.78 | 34.23 | 38.25 | 42.21 | 46.11 | 49.96 | 57.48 | 61.15 | 64.77 | 71.82 | 78.65 | 85.24 | 94.7 | 97.74 | 103.64 |
| 194 | | | | | | | | | | 34.6 | | 44.53 | 49.19 | 53.79 | 58.33 | 67.25 | 71.62 | 75.93 | 84.39 | 92.61 | 100.6 | 112.15 | 115.89 | 123.19 |
| 219 | | | | | | | | | | | | | 55.9 | 61.17 | 66.39 | 76.64 | 81.69 | 86.67 | 96.46 | 106.03 | 115.36 | 128.93 | 133.34 | 141.98 |

Cold-formed pipes for high pressure boilers

Hot-formed pipes for high pressure boilers

# PIPES FOR THE NUCLEAR INDUSTRY

Seamless hot-formed and cold-formed pipe made of austenitic grade steels is a critical element of nuclear power plant equipment. Pipes are used in pipelines, steam generators, condensers, and as fuel element cladding

MANUFACTURERS

TMK-INOX, CHTPZ, PNTZ

**FEATURES**

TMK-INOX manufactures pipes by cold-forming, cold rolling (on cold pilgers) or by drawing.

Hot-formed stainless steel pipes for the nuclear industry are produced at Chelyabinsk Pipe Plant on pilger mills. These mills are unique in that they can produce pipes with a diameter of up to 630 mm. Pipes are supplied after machining to ensure high surface quality.

Cold-formed stainless steel pipes for the nuclear industry are produced at Chelyabinsk Pipe Plant on cold pilgers. These mills can produce pipes with diameters from 90 mm to 426 mm and wall thicknesses from 2 mm to 40 mm.

**The existing product quality control and traceability system ensures compliance of manufactured products with the following standards:**

- TU 14-3R-197
- GOST 24030
- GOST 9941
- PNST 453
- TU 1.1.3.20.1433
- Additional technical requirements agreed with the customer

**The following types of pipes are available:**

- With etched surface
- With electrochemically polished surface
- With ground surface
- With surface heat treated in a protective atmosphere
- With combined surface types

## Size range

| Standards | Steel grade | Pipes dimensions | |
|---|---|---|---|
| | | Outside diameter, mm | Wall thickness, mm |
| 1 | 2 | 3 | 4 |
| GOST 9941 | 08Kh18N10T; 12Kh18N10T; 10Kh17N13M2T; 10Kh23N18; 06Kh28MDT; 08Kh22N6T | 5.0 | 0.2-1.0 |
| | | 5.0-426.0 | 0.2-40.0 |
| | | 6.0-7.0 | 0.2-1.5 |
| | | 8.0-9.0 | 0.2-2.0 |
| | | 10.0-13.0 | 0.2-2.5 |
| | | 14.0-17.0 | 0.2-3.0 |
| | | 18.0-19.0 | 0.2-3.5 |
| | | 20.0 | 0.2-4.0 |
| | | 21.0-24.0 | 0.3-4.0 |
| | | 25.0-28.0 | 0.3-4.5 |
| | | 30.0-38.0 | 0.3-5.5 |
| | | 40.0 | 0.3-6.0 |
| | | 42.0 | 0.3-6.0; 8.0; 9.0 |
| | | 45.0-50.0 | 0.3-9.0 |
| | | 51.0-56.0 | 0.5-9.0 |
| | | 57.0-60.0 | 0.5-10.0 |
| | | 63.0-73.0 | 1.8-10.0 |
| | | 76.0-83.0 | 2.8-10.0 |
| | | 85.0 | 3.2-10.0 |
| | | 89.0 | 2.8-10.0 |
| | | 95.0 | 2.0–10.0 |
| | | 100.0; 102.0 | 1.8-3.0 |
| | | 114.0 | 6.0 |
| GOST 10498 | 06Kh18N10T; 08Kh18N10T; 09Kh18N10T | 4.0-6.0 | 0.2-0.5 |
| | | from 6.0 to 10 | 0.12-0.70 |
| | | from 10 to 25 | 0.12-1.0 |
| | | from 25 to 75 | 0.3-1.0 |
| GOST 24030 | 08Kh18N10T | 6.0; 7.0; | 1.0-1.5 |
| | | 8.0; 9.0 | 1.0-2.0 |
| | | 10.0-13.0 | 1.0-2.5 |
| | | 14.0-17.0 | 1.0-3.0 |
| | | 18.0; 19.0 | 1.0-3.5 |
| | | 20.0-24.0 | 1.0-4.0 |
| | | 25.0-28.0 | 1.0-4.5 |
| | | 30.0-36.0 | 1.0-5.5 |
| | | 38.0 | 1.0-6.0 |
| | | 40.0-45.0 | 1.2-6.0 |
| | | 48.0-54. 0 | 1.4-7.5 |
| | | 56.0; 57.0 | 1.5-7.5 |
| | | 60.0-75.0 | 1.8-7.5 |
| | | 76.0-83.0 | 3.0-7.5 |
| PNST 453-2020 | 08Kh18N10T 08Kh18N10T-Sh | 6.0-10.0 | 1.0-2.0 |
| | | 11.0-13.0 | 1.0-2.5 |
| | | 14.0-21.0 | 1.0-4.0 |
| | | 22.0-28.0 | 1.0-4.5 |
| | | 30.0-38.0 | 1.0-6.0 |
| | | 40.0-45.0 | 1.2-7.0 |
| | | 48.0-54.0 | 1.4-7.0 |
| | | 56.0-76.0 | 1.5-7.0 |
| | | 83.0; 89.0 | 3.5-7.0 |
| | | 102.0; 114.0 | 5.0-7.0 |
| TU 1;1;3;20;1433-2018 | 08Kh18N10T; 08Kh18N12T; 12Kh18N10T; 12Kh18N12T | 6.0-10.0 | 1.0-2.0 |
| | | 11.0-13.0 | 1.0-2.5 |
| | | 14.0-21.0 | 1.0-4.0 |
| | | 22.0-28.0 | 1.0-4.5 |
| | | 30.0-38.0 | 1.0-6.0 |
| | | 40.0-45.0 | 1.2-7.0 |
| | | 48.0-54.0 | 1.4-7.0 |
| | | 56.0-76.0 | 1.5-7.0 |
| | | 83; 89 | 3.5-7.0 |
| | | 102; 114 | 5.0-7.0 |
| | | 355-1620 | 6-14 |
| 1 | 2 | 3 | 4 |

## Range (continued)

| Standards | Steel grade | Pipes dimensions | |
|---|---|---|---|
| | | Outside diameter, mm | Wall thickness, mm |
| 1 | 2 | 3 | 4 |
| TU 1.1.3.20.1432-2018<br>Steel pipes for nuclear power plants. Seamless steel pipes of non-alloy and alloy ferritic steels for equipment and pipelines of groups B and C. General specifications<br>PNST 394-2020<br>Steel pipes for the manufacture of equipment and pipelines for nuclear power plants. General technical requirements. Part 1. Seamless steel pipes of non-alloy and alloy steels | 25-89 | 2.5-12.2 | 20; 15KhM |
| TU 1.1.3.20.1433-2018<br>Steel pipes for nuclear power plants. Seamless steel pipes of austenitic stainless steels for equipment and pipelines of groups B and C. General specifications<br>PNST 453-2020<br>Steel pipes for the manufacture of equipment and pipelines for nuclear power plants. General specifications. Part 2. Seamless austenitic pipes of steel grades 08Kh18N10T and 08Kh18N10T-Sh | 60.3 | 6.3 | 08Kh18N10T |
| | 76.1 | 4.0 | |
| | 88.9 | 4-8 | |
| | 114.3 | 5-14.2 | |
| | 139.7 | 14.2-16.0 | |
| | 168.3 | 8.8-11 | |
| | 219.1 | 8.8-12.5 | |
| TU 1.1.3.20.1432-2018<br>Steel pipes for nuclear power plants. Seamless steel pipes of non-alloy and alloy ferritic steels for equipment and pipelines of groups B and C. General specifications<br>PNST 394-2020<br>Steel pipes for the manufacture of equipment and pipelines for nuclear power plants. General specifications. Part 1. Seamless steel pipes of non-alloy and alloy steels | 60.3 | 4.0-5.4 | 20. 15KhM |
| | 88.9 | 4.0 | |
| | 114.3 | 5.0 | |
| | 168.3 | 6.3 | |
| | 219 | 7.0 | |
| TU 13.03-011-00212179-2003<br>Spirall electric-welded pipes of grade 20 carbon steel for pipelines of nuclear power plants | 530-1420 | 8-14 | 20 |
| TU 95.349.2000<br>Longitudinal electric-welded pipes of steel grades 08Kh18N10T, 12Kh18N10T for nuclear and thermal power plants | 377-1220 | 6-14 | 08Kh18N10T; 12Kh18N10T |
| TU 95.499-00<br>Longitudinal electric-welded pipes of steel grades 20 and 16GS for nuclear and thermal power plants | | | 20 and 16GS |
| TU 14-3-1070-81 | 09Kh18N10T; 06Kh18N10T | from 4.0 to 6.0 incl. | 0.2-0.5 incl. |
| | | from 6.2 to 10.0 incl. | 0.2-0.7 incl. |
| | | from 10.2 to 25.0 incl. | 0.2-1.0 incl. |
| | | from 25.2 to 60.0 incl. | 0.3-1.0 incl. |
| TU 14-3-1109-82 | 08Kh18N10T; 08Kh18N12T; 12Kh18N10T; 12Kh18N12T; 10Kh17N13M2T | 5.0 | 0.2-1.0 |
| | | 6.0; 7.0 | 0.2-1.5 |
| | | 8.0; 9.0 | 0.2-2.0 |
| | | 10.0- 13.0 | 0.2-2.5 |
| | | 14.0-17.0 | 0.2-3.0 |
| | | 18.0; 19.0 | 0.2-3.5 |
| | | 20.0 | 0.2-4.0 |
| | | 21.0-24.0 | 0.3-4.0 |
| | | 25.0-28.0 | 0.3-4.5 |
| | | 30.0-35.0 | 0.3-5.5 |
| | | 36.0 | 0.4-5.5 |
| | | 38.0-45.0 | 0.4-6.0 |
| | | 48.0-50.0 | 0.4-7.0 |
| | | 51.0-60.0 | 0.5-7.0 |
| | | 63.0-75.0 | 1.5-7.0 |
| TU 14-161-216-2003 | 09Kh18N9 | 16.0 | 1.5-2.5 |
| TU 14-161-242-2012 | 03Kh18N13S2AM2VFBR-Sh | 18.0 | 3.0 |
| 1 | 2 | 3 | 4 |

## Range (continued)

| Standards | Steel grade | Pipes dimensions | |
|---|---|---|---|
| | | Outside diameter, mm | Wall thickness, mm |
| 1 | 2 | 3 | 4 |
| TU 1361-023-00212179-2005 | 08Kh14MF<br>08Kh14MF-Sh | 6; 7 | 1.0-1.5 |
| | | 8; 9 | 1.0-2.0 |
| | | 10; 11;12;13 | 1.0-2.5 |
| | | 14; 15; 16; 17 | 1.0-3.0 |
| | | 18; 19 | 1.0-3.5 |
| | | 20; 21; 22; 23; 24 | 1.0-4.0 |
| | | 25; 27; 28 | 1.0-4.5 |
| | | 30; 32; 34;35;36 | 1.0-5.5 |
| | | 38 | 1.0-6.0 |
| | | 40; 42;45 | 1.2-6.0 |
| | | 48; 50; 51; 53; 54 | 1.4-8.0 |
| | | 57 | 1.5-8.5 |
| | | 60; 63; 65;68 | 1.8-9.0 |
| TU 14-3R-197-2001 | 08Kh18N10T<br>08Kh18N10T-U | 6.0; 7.0 | 1.0-1.5 |
| | | 8.0; 9.0 | 1.0-2.0 |
| | | 10.0-13.0 | 1.0-2.5 |
| | | 14.0-17.0 | 1.0-3.0 |
| | | 18.0; 19.0 | 1.0-3.5 |
| | | 20.0-24.0 | 1.0-4.0 |
| | | 25.0-28.0 | 1.0-4.5 |
| | | 30.0-36.0 | 1.0-5.5 |
| | | 38.0 | 1.0-6.0 |
| | | 40.0-45.0 | 1.2-6.0 |
| | | 42.0-630.0 | 4.0-28.0 |
| | | 48.0-54.0 | 1.4-7.5 |
| | | 56.0; 57.0 | 1.5-7.5 |
| | | 60 | 5.5 |
| | | 63 | 6.5-7.0 |
| | | 68 | 2.0 |
| | | 76 | 3.0-7.0 |
| | | 83 | 3.5 |
| | | 89 | 5.0 |
| | | 114 | 5.0-7.0 |
| | | 16 | 1.5 |
| | | 95-426 | 2-40 |
| 1 | 2 | 3 | 4 |

# SPECIAL PIPES

Pipes for various industries: power, chemical, construction, machine building, automotive, food, medical and other industries.

This pipes are used in high-reliability high-pressure pipelines

MANUFACTURERS

VTZ, SinTZ, TMK-INOX, PNTZ, CHTPZ

**FEATURES**

Pipes manufactured by hot rolling with or without mechanical machining, cold rolling and drawing. Pipes meet different requirements for dimensions, steel grades, manufacturing tolerances, mechanical properties, and surface quality, depending on the production technique and the requirements of applicable standards.

Pipes are made of carbon and alloy steels to Russian and foreign standards as well as to manufacturer's specifications designed to meet the technical requirements of specific customers.

Mandatory testing and quality control is performed in full compliance with product standards and specific customer requirements.

**SPECIAL CAPABILITIES**

- Wide range of pipes (diameters from 1.5 mm to 630 mm, wall thicknesses from 0.25 mm to 70 mm)
- Manufacture of capilary pipes of minimal size (diameter from 1.5 mm)
- Manufacture of pipes with variable section

**TYPES OF ACCEPTANCE**

- Acceptance by customer
- Acceptance by Aviatechpriemka
- Russian Maritime Register of Shipping
- Russian River Register

## Standards

| Standards | Pipes dimensions | | Steel grade |
|---|---|---|---|
| | Outside diameter, mm | Wall thickness, mm | |
| 1 | 2 | 3 | 4 |
| ASTM A 213/A 213M<br>Standard Specification for Seamless Ferritic and Austenitic Alloy-Steel Boiler, Superheater, and Heat-Exchanger Tubes | 6.35-168.3 | 0.4-28 | TP304; TP304L; TP316; TP316L; TP316TI; TP321; TP304H; TP347; TP 347H |
| DIN EN 10297–1<br>Seamless circular steel tubes for mechanical and general engineering purposes Technical delivery conditions. Part 1. Non-alloy and alloy steel tubes | 26.9-108* | 2.6-11 | E235; E275; E355; 34CrNiMo6 |
| | 32-219.1 | 2.9-40.0 | |
| | 219.1 | 17.5 | 34CrMo4; E355 |
| | 244.5 | 17.5 | |
| | 273.1 | 8-9 | |
| | 355.6 | 7.4-10 | |
| | 355.6 | 12.7 | |
| | 406.4 | 8; 8.3; 11.5 | |
| | 413 | 10 | |
| DIN EN 10297-2 (DIN 17456)<br>Seamless circular steel tubes for mechanical and general engineering purposes. Part 1. Technical delivery conditions. Part 2. Stainless steel | 6-88.9 | 0.8-8 | X6CrNiTil810 |
| GOST 800-78<br>Bearing tubes | 23.0-81.2* | 4.0-12.0 | ShKh15; ShKh15-V; ShKh15SG; ShKh15-Sh; ShKh15SG-Sh; 100Cr6; 100CrMnSi6-4; ShKh15SG-V |
| | 53.4-200.0 | 6.4-29.2 | |
| GOST 1060-83<br>Cold-formed seamless steel tubes for shipbuilding | 17-60 | 2.0-3.75 | 10 |
| GOST 24030-80<br>Corrosion-resistant steel seamless tubes for power engineering industry | 6-83 | 1-7.5 | 08Kh18 N YuT |
| TU 14-3-292-74<br>Semi-finished rectangular pipes for cotton harvesters | 120x60* | 5.5 | 20; 35 |
| TU 14-3-335-75<br>Seamless hot-rolled pipes of ShKh-15 steel grade | 83.0-219.0 | 7.0-42.0 | ShKh15; ShKh15-Sh; ShKh15CG; ShKh15CG-Sh |
| TU 14-3-367-75<br>Seamless hot-rolled pipes for aircraft equipment | 70-219 | 16-30 | 12Kh2N4A-VD; 18Kh2N4MA-Sh; 12Kh2N4-VD |
| TU 14-3-474-76<br>Seamless cold-drawn pipes for the manufacture of absorption refrigerators | 6-63* | 0.6-1.3 | 10; 20 |
| TU 14-3-675-78<br>Seamless hot-rolled steel pipes for aircraft equipment | 38-450 | 3.5-55.0 | 10–45; 38KhA; 30KhGSA; 30KhGSN2A; 12KhNZA; 38Kh2 MYuA; 30KhGSNMA |
| TU 14-3-730-78<br>Seamless cold-drawn pipes for monopole antenna rods | 6-12 | 1.2 | 30KhGSA |
| TU 14-3-772-78<br>Seamless hot-formed steel pipes | 78-121 | 12.0-21.0 | 35; 45; 15Kh; 40Kh |
| TU 14-156-89-2010<br>Seamless hot-formed high-precision steel pipes for submersible motor and pump housings | 92.3-125.0 | int. 78-107 | 33; 35; 35G |
| TU 14-156-53-2005<br>Seamless hot-formed pipes of steel grade ShKh4 | 70.0–171.0 | 7.1–28.0 | ShKh4; ShKh4-V |
| TU 14-157-53-2000<br>Square hot-rolled steel pipes for structures and machine parts and for other technical purposes | 112x112 | 19 | St. YuA; st. 20A |
| TU 14-159-161-90<br>Cold-formed seamless steel pipes for vehicle parts | 45* | 8.5 | 35; 45 |
| TU 14-159-195-90<br>Hot-formed pipes of steel grades 15KhM and 30KhMA for the bushings of chain links of heavy industrial tractor tracks | 83-92 | 12.0-23.0 | 15KhM; 30KhMA |
| TU 14-3R-579-2007<br>Thick-walled steel pipes for diesel engines | 146-219 | 18.0-42.0 | 38Kh2MYuA |
| TU 14-3R-773-2007<br>Cold-formed seamless steel pipes | 4-83* | 0.5-12 | 10; 20; 30; 35; 45; 15H; 20H; 40H; 30KhGSA |
| 1 | 2 | 3 | 4 |

* Cold-formed.

## Microstructure of bearing tube metal (after isothermal spheroidizing annealing)

| Steel grade | Micropores, points | Microstructure | Remaining carbide network, points | Carbide segregation, points | Micropores, points | Non-metallic inclusions, points | Hardness, HB |
|---|---|---|---|---|---|---|---|
| | | | max | | | | |
| ShKh15, ShKh-15V | 2.0 | fine-grained perlite | 3 | 1.5 | 2.0 | 2.5* | 207–255 cold-def. pipes<br>207–187 hot-def. pipes |
| ShKh15SG | 2.0 | fine-grained perlite | 3 | 1.5 | 2.0 | 2.5 | 217 - 197 |

* Acceptable score for oxides, sulfides and globules.

## Bearing tube range

| Outside diameter, mm | Wall thickness, mm | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 3.0 - 6.9 | 7.0 - 9.0 | 9.1 - 10.0 | 10.1 - 11.0 | 11.1 - 13.0 | 13.1 - 15.0 | 15.1 - 17.0 | 17.1 - 19.0 | 19.1 - 21.0 | 21.1 - 23.0 | 23.1 25.0 |
| 20.0-83.0* | | | | | | | | | | | |
| 56.0-60.0 | | | | | | | | | | | |
| 60.1-70.0 | | | | | | | | | | | |
| 70.1-80.0 | | | | | | | | | | | |
| 80.1-90.0 | | | | | | | | | | | |
| 90.1-100.0 | | | | | | | | | | | |
| 100.1-110.0 | | | | | | | | | | | |
| 110.1-120.0 | | | | | | | | | | | |
| 120.1-130.0 | | | | | | | | | | | |
| 130.1-140.0 | | | | | | | | | | | |
| 140.1-150.0 | | | | | | | | | | | |
| 150.1-160.0 | | | | | | | | | | | |
| 160.1-170.0 | | | | | | | | | | | |
| 170.1-180.0 | | | | | | | | | | | |

Range by agreement

Cold-formed bearing tube

Hot-formed bearing tube

Bearing tube range is limited by the ratio of outside diameter to wall thickness D/S = 4–15. Minimum ID of hot-rolled bearing tube is 48 mm.
Pipes lengths: 2.0 m to 5.0 m (hot-rolled) or 2.5 m to 4.5 m (cold-rolled).
Limit deviations of pipes dimensions:
a) OD
+0.2 mm for hot-rolled bearing tube
+0.4 mm for 20.0 mm–60 mm cold-rolled bearing tube+0.5 mm for 60.1 mm–83.0 mm cold-rolled bearing tube

b) Wall thickness

| | | |
|---|---|---|
| for hot-rolled pipes: | 4.0 < D/S ≤ 11 | +15% |
| | 11.0 < D/S ≤ 12.5 | +20% |
| | 12.5 < D/S ≤ 15 | +25% |
| for cold-rolled pipes: | +12% | |

c) Curvature 1.0 mm per meter length

# 04.

# Products for infrastructural projects

# PIPES FOR PILE FOUNDATIONS AND HYDRAULIC STRUCTURES

## (TUBULAR SHEET PILES)

Piles and tubular welded sheet piles are used across all climatic regions in the sheet piling of permanent and temporary structures in hydraulic, transport, industrial, and civil engineering

MANUFACTURERS

CHTPZ, SOT,
TMK Steel Technologies

**FEATURES**

Piles and tubular sheet piles are made from longitudinal electric welded large diameter steel pipes produced by Vysota 239, of various steel grades, with diameters from 508 mm to 1,422 mm, 2,020 mm and 2,520 mm, and wall thicknesses from 7 mm to 50 mm. Single-segment piles and welded tubular sheet piles are available in lengths up to 18.3 m. Butt-weld piles and tubular sheet piles can be supplied with lengths up to 24 m. Tubular sheet piles can be manufactured with different types of interlocks depending on the customer requirements. If and when necessary, piles and sheet piles can be supplied with reinforcing pads at the top and bottom ends. Anti-corrosion coating can be applied on request.

## Piles

| Standards | Pipes dimensions | | Steel grade |
|---|---|---|---|
| | Outside diameter, mm | Wall thickness, mm | |
| 1 | 2 | 3 | 4 |
| EN 10219-1:2006<br>Cold formed welded structural hollow sections of non-alloy and fine grain steels | 508-1,422 | 7-48 | S235JRH; S275J0H; S275J2H; S275NH; S275MH; S275NLH; S275MLH; S355NH; S355J0H; S355K2H; S355J2H; S355MH; S355NLH; S355MLH; S420MH; S420MLH; S460NH; S460MH; S460NLH; 460MLH |
| | 2,020; 2,520* | 20-40 | |
| GOST 10706-76<br>Electric welded longitudinal steel pipes | 508-1,422 | 7-48 | St3; steel 20; 17G1S; 17G1SU; 13GS; 13GSU; 13GS1SU; 08GBYu; 09GBYu; 12GSB; 12GS2SB; 08G1NFB; 10G2FBYu; 09GSF; 13KhFA |
| | 2,020 | 20-40 | |
| GOST 20295-85<br>Steel welded pipes for main gas-and-oil pipelines | 508-1,422 | 7-48 | KZ4; K38; K42; K50; K52; K54; K55; K56; K60 |
| GOST 33228-2015<br>Steel welded pipes for general purposes | 508-1,422 | 7-48 | KP175; KP185; KP195; KP205; KP235; KP245; KP265; KP345; KP355; KP380; KP390; KP410; KP460 |
| TU 1381-020-00186654-2011<br>Longitudinally electric-welded steel pipes with diameters from 530 to 1,420 mm with improved weldability and for low-temperature service for use in steel structures of buildings | 508-1,422 | 7-48 | K52; K54; K56; K60; Kh56; Kh60; Kh65; Kh70 |
| TU 1381-042-00186654-2012<br>Longitudinally electric-welded steel pipes with diameters from 530 to 1,420 mm with improved weldability and for low-temperature service for use in steel structures of buildings | 508-1,422 | 7-48 | S345; S375; S390; S440 |
| TU 14-3R-124-2017<br>Seamless steel pipes with improved corrosion resistance for the development | 76-426 | 6-22<br>6.0-28.0<br>6.5-28.0<br>7.0-32.0 | 13KhFA; 08KhMChA 20A; 20S; 20FA |
| | 108-168 | | |
| | 168-426 | | |
| Other customer-specified standards | 508-1,422 | 7-48 | |
| | 2,020; 2,520* | 20-40 | |
| 1 | 2 | 3 | 4 |

* Preparation of production.

## Pipes sheet pile

| Standards | Pipes dimensions | | Steel grade | Shaped steel sections for tong-and-groove joints |
|---|---|---|---|---|
| | Outside diameter, mm | Wall thickness, mm | | |
| 1 | 2 | 3 | 4 | 5 |
| GOST R 52664-2010<br>Welded pipes sheet piles | 508-1,422 | 7-48 | Depending on the pipes specifications and customer requirements | ZSG1; ZZSG1*; SG2; Larsen 4; Larsen 5; GU16-400; ShK-1; UT; FL-510; FL-511; FL-512; AS 500-9;5; AS500-11;0; AS 500-12;0; GR; OB; UG; UE; PB; other interlocks of various shapes available on demand |
| | 2,020; 2,520* | 20-40 | | |

# 05.

# CONTINUOUS CAST BILLET

# CONTINUOUS CAST BILLET
# ROUND BILLETS. SQUARE BILLETS

Continuous cast square and round billets of carbon and alloy steels with special properties are used in the production of pipes, long products and special products

MANUFACTURERS

VTZ, STZ, TAGMET, PNTZ

**FEATURES**

- Steel melting in electric arc furnaces, secondary steelmaking with vacuum degassing (as and when required by applicable standards) and continuous casting
- Tight tolerances on alloying element content
- Ultrapure metal with low content of harmful impurities (maximum 0.005% sulfur and maximum 0.010% phosphorus)
- Supply of machined billets
- Obtaining a fine-grain structure

**SIZE RANGE**

**Square billets with the following side lengths:***

- 360 (360), 300 (300), 240 (240) mm

**Round billets with the following diameters:***

- 145, 150, 156 (150), 196 (190), 210, 228 (220), 250, 290, 340 (330), 360 (350), 400, 410, 550, 600 mm

* Dimensions in parentheses are for machined billets.

## Standards

| Standards | Billet dimensions | | |
|---|---|---|---|
| | Cross-section dimensions,* mm | | Length, m |
| 1 | 2 | 3 | 4 |
| STO VTZ 53570464-10-2021<br>Continuous cast billet made in EAF | Cast round bar | 150 | 8.4-11.5 |
| | | 156 | 8.4-11.5 |
| | | 196 | 8.0-11.5 |
| | | 228 | 6.0-11.5 |
| | | 260 | 6.0-11.5 |
| | | 340 | 4.0-11.0 |
| | | 360 | 4.0-11.0 |
| | | 410 | 4.0-8.50 |
| | Square | 240 | 4.0-9.0 |
| | | 300 | |
| | | 360 | |
| STO STS 22.03-2021<br>Continuous cast steel billets for the manufacture of hot-formed seamless pipes | Round | 290 | 3.0-12.0 |
| | | 360 | |
| STO TAGMET 00186602-003<br>Continuous cast round billet for the manufacture of seamless pipes | Round | 150 | 5.16-12.0 |
| | | 210 | 4.5-12.0 |
| | | 250 | 3.75-12.0 |
| | | 300 | 3.6-12.0 |
| | | 340 | 3.6-12.0 |
| | | 400 | 3.6-12.0 |
| STO TMK 56601056-008-2006<br>Continuous cast round steel billet for the manufacture of seamless pipes | Unmachined round | 156 | 5.8-11.3 |
| | Round | 150-156 (150-145) | |
| | Machined round | 150; 145 | |
| TU 14-1-4944-2003<br>Continuous cast square billets for pipes and long products | Square | 240 | 4.0-8.7 |
| | | 300 | |
| | | 360 | |
| GOST 10791, GOST R 51220, DIN EN 13262<br>Continuous cast round steel billet for the manufacture of rail wheels | Round | 400; 460 | 5.0-10.0 |
| EN 10083-2<br>Continuous cast square steel billet for quenching and tempering | Square | 360x360 | 8.0 |
| GOST 4728<br>Continuous cast round steel axle billets for railway rolling stock as per GOST 33200, DIN EN 13261 | Round | 400 | 4.0-6.0 |
| SAE 1006, SAE 1008<br>Continuous cast square steel billet for wire rod manufacture | Square | 150x150 | 10.0-12.0 |
| GOST 380<br>Continuously cast square steel billet for the manufacture of reinforcing steel | Square | 125x125 | 3.0-4.0 |
| 1 | 2 | 3 | 4 |

* Dimensions in parentheses are for machined billets.

Steel grades as per GOST 380, 1050, etc.

Billets may be accepted in accordance with OST 14-21-77 and STP 156.02.03-2004 by agreement with the customer

# 06.

## Anti-corrosion pipe coating

# ANTI-CORROSION PIPE COATING

MANUFACTURERS

Truboplast,
TMK NGS-Nizhnevartovsk,
TMK PS, "Uralchermet"

**Truboplast applies the following types of coatings:**

- External anti-corrosion epoxy coating
- External two or three-layer extruded polyethylene based anti-corrosion coating
- External thermal insulation and waterproofing consisting of a layer of rigid polyurethane foam, with an anti-corrosion coating of steel pipes and an outer protective waterproof (PE, galvanized, metal-polymer) sheath
- External thermal insulation and waterproofing consisting of a layer of rigid polyurethane foam, with an anti-corrosion coating of steel pipes and an outer protective waterproof sheath

A range of coatings and materials for the corrosion protection of the external surface of weld joints by Truboplast provide complete corrosion protection of steel pipes.

**TMK NGS-Nizhnevartovsk applies the following types of anti-corrosion coatings to pipes:**

- External anti-corrosion epoxy coating
- External two and three-layer anti-corrosion extruded polyethylene coating,
- Internal two-layer anti-corrosion coating for pipeline, tubing and drill pipes

Additionally, TMK NGS-Nizhnevartovsk applies external and internal anti-corrosion coatings on pipeline connection elements

**TMK PS applies the following types of anti-corrosion coatings to pipes:**

- External single-layer anti-corrosion epoxy coating
- External two-layer anti-corrosion epoxy coating
- External two-layer anti-corrosion PE coating
- External three-layer anti-corrosion PE coating
- External single-layer anti-corrosion PE coating
- External three-layer anti-corrosion PP coating
- External protective coating
- Internal flow coating
- Internal anti-corrosion coating (including for water pipelines)

TMK PS (Chelyabinsk) also applies thermal insulation made of polyurethane foam in a protective sheath to pipes and connection elements. Pipes with thermal insulation may additionally include the following: inserts to prevent spread of fire, a remote control system, tubes for induction heater/ resistive heaters.

**Uralchermet applies the following types of anti-corrosion coatings to pipes:**

- External single-layer anti-corrosion epoxy coating
- External two-layer anti-corrosion extruded polyethylene based coating
- External three-layer anti-corrosion extruded polyethylene based coating
- External single-layer anti-corrosion polyethylene coating
- External thermal insulation and waterproofing consisting of a layer of rigid polyurethane foam,with an anti-corrosion coating of steel pipes and an outer protective waterproof sheath

## Standards. Intended use

| Standards | Intended use of coated pipes |
|---|---|
| 1 | 2 |
| CAN CSA Z245.21-14<br>Factory-Made External Polyethylene Coating for Steel Pipes | For buried or submerged pipelines in oil or gas transportation systems |
| DIN 30670:2012<br>Polyethylene coatings on steel pipes and fittings. Requirements and testing | Protection of buried or submerged steel pipelines |
| DIN 30678:2013<br>Polypropylene coatings on steel pipes and fittings. Requirements and testing | Corrosion protection of buried or submerged steel pipes and fittings used to convey liquids and gases |
| DIN EN ISO 21809-1:2011<br>Petroleum and natural gas industries – External coatings for buried or submerged pipelines used in pipeline transportation systems. Part 1. Polyolefin coatings (3-layer PE and 3-layer PP) | Corrosion protection of welded and seamless pipes used in pipeline transportation systems in the oil and gas industry |
| ISO 21809-1-2018<br>Petroleum and natural gas industries – External coatings for buried or submerged pipelines used in pipeline transportation systems. Part 1. Polyolefin coatings (3-layer PE and 3-layer PP) | Corrosion protection of welded and seamless steel pipes for transportation systems in the oil and gas industry |
| GOST R 51164-98<br>Steel pipes mains. General requirements for corrosion protection | Trunk pipelines transporting natural gas, oil and petroleum products; other pipelines |
| GOST 9.602-2016<br>Underground constructions. General requirements for corrosion protection | Corrosion protection of the outer surfaces of steel structures below grade or in an embankment: pipelines transporting natural gas (trunk or distribution pipelines), crude oil or petroleum products, and their branch lines; water pipelines; piles, sheet piles, columns, and other load-bearing below-grade steel structures |
| GOST 31448-2012<br>Steel pipes with defensive coverings for main gas and oil pipelines | Construction and repair of trunk gas, oil pipelines and petroleum product pipelines |
| 1 | 2 |

## Size range

| Coated pipes diameter, mm | Length, m | Wall thickness, mm |
|---|---|---|
| | | |
| EXTERNAL COATING | | |
| 114-426 | 8-12.5 | 6-36 |
| 508-1422 | 9-18.3 | 7-45 |
| INTERNAL COATING | | |
| 508-1422 | 9-18.3 | 7-42 |
| THERMAL INSULATION OF PIPES | | |
| 530-1020 | 10.5-12.2 | 8 -19 |
| THERMAL INSULATION OF CONNECTION ELEMENTS | | |
| 426-1220 | 4-12.2 | 8-24 |

## Properties of two and three-layer extruded polyethylene based coatings

| Property | Requirement | |
|---|---|---|
| | two-layer coating | three-layer coating |
| 1. Appearance | Coating must be continuous with black smooth uniform surface, without visually detectable peeling, bubbles or gaps | |
| 2. Minimum coating thickness, mm | High type according to GOST R 51164-98<br>Up to 273 incl. 2.0<br>From 273 to 530 incl. 2.2<br>From 530 to 720 incl. 2.5<br>Very High type according to GOST R 9.602-2005<br>From 57 to 89 incl. 2.2<br>102 to 259 2.5<br>273 to 426 3.0<br>530 to 720 3.5 | |
| 3. Dielectric continuity | Ability to withstand a voltage of no less than 5 kV per 1 mm of coating thickness + 5 kV without breakdown | |
| 4. Minimum contact resistance of coating in a 3% NaCl solution at (20±5)°C, Ω·m²:<br>– initial<br>– after 100 days in the solution | $10^{10}$<br>$10^{9}$ | |
| 5. Minimum impact strength, J/mm of coating thickness, at:<br>(50±3)°C<br>(20±5)°C<br>minus (40±3)°C | 3<br>5<br>6 | 3<br>5<br>6 |
| 6. Minimum coating adhesion to steel, N/cm of width, at:<br>(20±5)°C<br>(40±3)°C<br>(60±3)°C | 70<br>50<br>20 | 100<br>70<br>30 |
| 7. Minimum coating adhesion to steel, N/cm of width, after holding for 1,000 h in water at:<br>(20±5)°C<br>(40±3)°C<br>(60±3)°C | 50<br>50<br>50 | –<br>–<br>– |
| 8. Maximum reduction of coating adhesion to steel, % of the initial value, after holding in water for 1,000 h at:<br>(20±5)°C<br>(60±3)°C | –<br>– | 30<br>33 |
| 9. Maximum peeling area under cathodic polarization, cm², after 30 days of testing in a 3% NaCl solution at:<br>(20±5)°C<br>(40±3)°C<br>(60±3)°C | 5.0<br>10.0<br>15.0 | 4.0<br>–<br>10.0 |
| 10. Minimum tensile strength of peeled coating, MPa, at:<br>(20±5)°C<br>(60±3)°C | 12.0<br>10.0 | 12.0<br>10.0 |
| 11. Minimum elongation at break of peeled coating, %, at:<br>(20±5)°C<br>minus (40±3)°C | 200<br>100 | 350<br>100 |
| 12. Maximum reduction of elongation at break of peeled coating, % of initial value after holding for 1,000 h in air at (110±3)°C | 25 | 25 |
| 13. Change in the polyethylene melt flow rate, % from the initial value, after holding for 100 days in air at (110±3)°C | 35 | 35 |
| 14 Minimum cracking resistance of coating at (50±3)°C, h | 1,000 | 1,000 |
| 15. Minimum resistance to UV radiation with a flux of 600 kW·h/m at (50±3)°C, h | 500 | 500 |
| 16. Minimum fungus resistance, points | 2 | 2 |
| 17. Minimum penetration (indentation) resistance, mm, at:<br>(20±5)°C<br>(60±3)°C | 0.2<br>0.3 | 0.2<br>0.3 |
| 18. Minimum coating resistance to thermal cycling; number of cycles without peeling or cracking of the coating at temperatures:<br>from minus (50±3)°C to plus (20±5)°C<br>from minus (60±3)°C to plus (20±5)°C<br>(for Far North environments) | 10<br>– | –<br>10 |

## Properties of external single-layer anti-corrosion PE pipes coating

| Property | Value for coating types: | | | |
|---|---|---|---|---|
| | Normal | Special | Heat-resistant | Special heat-resistant |
| 1. Minimal total coating thickness, mm, for pipes of a diameter:<br>up to 273 mm incl.<br>greater than 273 mm to 530 mm<br>530 mm–820 mm<br>820 mm–1,420 mm | 2.0<br>2.2<br>2.5<br>3.0 | 2.5<br>2.7<br>3.0<br>3.5 | 2.0<br>2.2<br>2.5<br>3.0 | 2.5<br>2.7<br>3.0<br>3.5 |
| 2. Dielectric continuity of coating Absence of breakdown at electrical voltage, kV, minimum | 20 | | | |
| 3. Minimum elongation at break of PE coating layer at minus 45°C, % | 100 | | | |
| 4. Minimum impact resistance of coating, J/mm, at:<br>minus 45°C<br>60°C | 7 (5)2<br>4 (3) 2 | 8<br>5 | 7<br>4 | 8<br>5 |
| 5. Minimum coating adhesion, N/cm, at:<br>25°C<br>60°C<br>80°C | 200 (120) 2<br>80 (50) 2<br>– | 250<br>100<br>– | 250<br>–<br>100 | 250<br>–<br>100 |
| 6. Minimum coating adhesion at 23°C after holding in water for 1,000 h, N/cm, at:<br>80°C<br>95°C | 100 (70) 2<br>– | 100<br>– | –<br>100 | –<br>100 |
| 7. Minimum initial contact resistance of coating in a 3% NaCl aqueous solution at 23°C, Ω·m² | 1,010 | | | |
| 8. Coating resistance under cathodic polarization. Maximum area of peeling after holding for 30 days, cm², at:<br>60°C<br>80°C | 10<br>– | 10<br>– | –<br>20 | –<br>20 |
| 9. PE coating layer resistance to thermal aging. Minimum elongation at break after holding in air for 100 days, %, at:<br>110°C<br>120°C | 400 (300) 2<br>– | 400<br>– | –<br>400 | –<br>400 |
| 10. Coating resistance to thermal cycling, maximum number of cycles, for temperature variation between minus 60°C and plus 23°C | 10 | 10 | 10 | 10 |
| 11. Degree of cure of primer ΔTg, °C | Within a range of minus 3 ≤ ΔTg ≤ plus 2 | | | |
| 12. Maximum PE coating layer shrinkage at 150°C, % | 45 | | | |

## Properties of external three-layer anti-corrosion PP pipes coating

| Property | Value for coating types: | |
|---|---|---|
| | DIN 30678 | ISO 21809-1 |
| 1. Minimal total coating thickness, mm, for pipes of diameters:<br>up to 273 incl.<br>greater than 273 to 530 incl.<br>greater than 530 to 820 incl.<br>greater than 820 | 2.0<br>2.2<br>2.5<br>3.0 | Depending on pipes weight and coating class |
| 2. Minimum dielectric continuity of coating, kV | 25 | 10 kV/mm, but no more than 25 kV |
| 3. Minimum coating adhesion, N/cm of width, at testing temperatures of:<br>a) (25±10)°C<br>b) (90±3)°C<br>c) (110±5)°C | 250<br>40<br>– | 250<br>40<br>– |
| 4. Minimum impact resistance of coating, J/mm of thickness, at 20°C or 25°C: | 10 | 10 |
| 5. Maximum area of cathodic coating peeling, cm², after 30 days of testing at:<br>a) (20±5)°C<br>b) (60±3)°C<br>c) (80±5)°C | 7 (28 days)<br>7 (24 h)<br>15 (28 days) | 7 (28 days)<br>7 (24 h)<br>15 (28 days) |
| 6. Coating resistance to thermal cycling; minimum number of cycles without coating peeling or cracking, at temperatures from minus 20°C to plus °C | – | – |
| 7. Minimum resistance of coating to indentation (penetration), mm, at test temperatures of:<br>a) (20±5)°C<br>b) (60±3)°C | 0.1<br>– | 0.1<br>0.4 (at the maximum temperature) |

### INTERNAL PIPE COATING

Internal coating, depending on its type, is designed to reduce hydraulic resistance of gas pipelines and protect the internal surface of pipes from atmospheric corrosion during pipe transportation, storage and installation.

Internal coating can be applied before or after external coating application. Allowable ambient temperatures for continuous operation of gas pipelines range from –20°C to +80°C.

## Standards

| Standards | Purpose of coating |
|---|---|
| 1 | 2 |
| API* 5L2 (RP 5L2)-2015<br>Recommended Practice for Internal Coating of Line Pipes for Non-corrosive Gas Transmission Service (smooth coating) | For non-corrosive gas transmission.<br>Coating is intended for drag reduction in gas pipelines, as well as for the protection of internal surface of pipes against atmospheric corrosion during transportation, storage and installation |
| 1 | 2 |

## Properties of internal drag-reduction (smooth) coating

| Property | Unit of measurement | Parameters |
|---|---|---|
| 1. Thickness of cured coating | µm | 60 - 150 |
| 2. Cross-cut test of coating adhesion | points | 1 |
| 3. Maximum adhesion of coating after holding for 240 hours in water at (20+5)°C as determined by the cross-cut test | points | 2 |
| 4. Coating resistance to bending | mm | 10 |
| 5. Minimum Buchholz hardness | hardness units | 94 |
| 6. Maximum number of pores in the coating<br>a) uncured<br>b) cured | pores/cm$^2$ | 0 |
| 7. Coating resistance to changes in gas pressure | – | 1<br>No bubbles or damage after the 10$^{th}$ cycle |
| 8. Coating resistance to changes in hydraulic pressure | – | No bubbles or damage after the 1$^{st}$ cycle |
| 9. Resistance against exposure to salt spray at (25±5)°C for 240 hours | – | Absence of bubbles and peeling |
| 10. Maximum coating roughness (Rz) | µm | 15 |

## Properties of thermal insulation and waterproof coating

| Property | Norm |
|---|---|
| 1. Appearance | Fine-cell yellow to dark brown material |
| 2. Minimum density, kg/m$^3$ | 60 |
| 3. Minimum compressive strength at 10% deformation in radial direction, MPa | 0.3 |
| 4. Minimum volume fraction of closed pores, % | 88 |
| 5. Use temperature, °C | 130 |
| 6. Maximum water absorption in a 90-minute boiling test, vol% | 10 |
| 7. Minimum axial shear strength, MPa, at:<br>(23±2)°C<br>(140±2)°C* | <br>0.12<br>0.08 |
| 8. Minimum tangential shear strength, MPa, at:*<br>(23+2)°C<br>(140±2)°C | <br>0.2<br>0.13 |
| 9. Maximum radial creep at a test temperature of 140°C, mm, after:*<br>100 h<br>1,000 h | <br>2.5<br>4.6 |
| 10. Maximum thermal conductivity at an average temperature of 50°C, W/m·°C | 0.033 |

## Properties of external epoxy coating

| Property | Parameters |
|---|---|
| | Modification: normal (N) |
| 1. Appearance | Homogeneous, smooth surface without visually detectable gaps, tears, chips, bubbles, or cracks. Separate sags, worn spots, scratches, or traces of repair are allowed |
| 2. Dielectric continuity | Absence of breakdown at 2.5 kV |
| 3. Minimum thickness, mm | 0.35 |
| 4. Minimum impact resistance at temperatures from minus 40°C to 40°C, J, for pipes diameters:<br>from 57 mm to 273 mm<br>from 325 mm to 530 mm | <br>4.0<br>6.0 |
| 5. Maximum adhesion to steel at 20°C and 80°C, points | 1 |
| 6. Maximum adhesion to steel after holding in water for 1,000 hours at 20°C and 50°C, points | 1 |
| 7. Maximum peeling area after holding for 30 days in a 3% NaCl solution at a polarization potential of minus 1.5 V, $cm^2$, at:<br>20°C<br>80°C | <br>5.0<br>8.0 |
| 8. Minimum contact resistance after holding in a 3% NaCl solution at 20°C for 100 days, $\Omega \cdot m^2$ | $10^7$ |
| 9. Minimum elongation at break of free film at 20°C, % | 5 |
| 10. Maximum indentation (penetration) resistance, mm, at:<br>20°C<br>80°C | <br>0.2<br>0.3 |

### THERMAL INSULATION MADE OF POLYURETHANE FOAM

**Pipes and connection elements for heating networks and oil and gas pipelines are available with anti-corrosion coatings in thermal insulation made of polyurethane (PU) foam as well as with the following protective sheaths:**

- Galvanized steel for aboveground and cased underground pipelines
- Steel with polymer coating for underground pipelines

Pipes with PU foam insulation can be provided with inserts preventing spread of fire. Pipes and connection elements can be equipped with sensor wires for surveillance systems and tubes for an induction-resistance heating system (IRHS).

## Standards. Intended use

| Standards | Purpose of coating |
|---|---|
| GOST 30732-2020<br>Steel pipes and shaped products with foamed polyurethane thermal insulation in protective sheath | Pipes and fittings for underground heating networks (uncased, in ducts impassable for people or in crawl space; or, when steel galvanized sheath is provided, in service ducts or tunnels) or aboveground heating networks (hereinafter referred to as insulated pipes and fittings) with the following design parameters of heat transfer medium (superheated water): working pressure according to the design documentation and temperature up to 150°C, with heat supply control range of 150°C to 70°C |

## Properties of thermal insulation coating

| Property | Value |
|---|---|
| 1. Appearance | Rigid cellular plastic of light yellow to light brown color with uniform fine-cell structure |
| 2. Minimum apparent density, $kg/m^3$ | 60 |
| 3. Minimum compressive strength at 10% deformation in radial direction, MPa | 0.3 |
| 4. Maximum thermal conductivity at (50±3)°C, W/m·K | 0.033 |
| 5. Maximum water absorption in 90-minute boiling test, vol% | 10 |
| 6. Minimum axial shear strength at (23±2)°C, MPa | 0.12 |
| 7. Minimum tangential shear strength at (23±2)°C, MPa | 0.2 |

# 07.

## Cylinders

# CYLINDERS

Cylinders are intended for the storage and transportation of various compressed, liquefied and dissolved gases at temperatures from minus 50°C to plus 60°C at a high operating pressure

MANUFACTURERS

PNTZ

**FEATURES**

Cylinders are all-metal and seamless.

**Cylinders are classified by capacity into:**

- small capacity, up to 12 l
- medium capacity, up to 50 l
- large capacity, from 80 l to 650 l

Cylinders are made from seamless pipes of unalloyed or alloyed (including stainless) steel grades.

Small- and medium-capacity cylinders can be made with one or two necks, and with a concave base in line with regulatory requirements.

Small- and medium-capacity cylinders can be supplied with valves, rings, caps, and boots in line with regulatory requirements.

Large-capacity cylinders can be made with one or two necks in line with regulatory requirements.

Large-capacity cylinders are supplied without valves.

Cylinders are marked and painted in line with the customer's order and regulatory documentation.

Cylinders, other than those listed in the table, can be made to various technical specifications.

| Standards number and OKP code | Product name | Capacity, l | Working pressure, MPa (kgf/cm$^2$) | Diameter, mm | Steel grade |
|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 |
| ISO 11439:2000 | Gas cylinders – High pressure cylinders for the on-board storage of natural gas as a fuel for automotive vehicles | 52; 77; 108 | 20.0 (204) | 321; 356 | 34CrMo4 |
| GOST 949-73<br>OKPD2 25.29.12.110 | Small- and medium-capacity steel gas cylinders for $P_w \leq 19.6$ MPa (200 kgf/cm$^2$). Note: 1. Cylinders with capacities and lengths other than those specified in Table 1 of GOST 949-73, can be manufactured at the customer's request. 2. Cylinders with a concave base can be manufactured by agreement with the customer | 0.4; 0.7; 1.0; 1.3; 2.0; 3.0; 4.0; 5.0; 6.0; 7.0; 8.0; 10.0; 12.0 | 9.8 (100) 14.7 (150) 19.6 (200) | 70; 89; 108; 140 | Non-alloy steel. 30KhGSA |
| OKPD2 25.29.12.110 | Cylinders with a capacity of 2.0 l or less, with a spherical base only | 20; 25; 32; 40; 50 | | 219 | |
| GOST 9731-79<br>OKPD2 25.29.12.120 | Steel seamless cylinders of large capacity for gases for $P_w \leq 24.5$ MPa (250 kgf/cm$^2$).Note: 1. Cylinders of modifications 1 and 3 for $P_w = 24.5$ MPa (250 kgf/cm$^2$) can be made by agreement with the customer | 80; 100; 130; 160; 200; 250; 320; 400; 500 | 9.8 (100)<br>14.7 (150)<br>19.6 (200)<br>24.5 (250) | 325; 377; 426; 465 | Non-alloy steel |
| | | 80; 100; 130; 160; 200; 250; 320; 400; 500 | 14.7 (150)<br>19.6 (200)<br>24.5 (250) | 325; 377; 426; 465 | 38KhA.<br>40Kh |
| GOST 12247-80<br>OKPD2 25.29.12.120 | Large seamless steel gas cylinders for operating pressure of 31.4 and 39.2 MPa (320 and 400 kgf/cm$^2$). Note: 1. Cylinders of modifications 1 and 3 can be made by agreement with the customer | 80; 100; 130; 160; 200; 250; 320; 400; 500 | 31.4 (320)<br>39.2 (400) | 325; 377; 426; 465 | 38KhA.<br>40Kh |
| TU 1410-007-29416612-2005 | Steel cylinders for inert gas storage in gaseous fire extinguishing systems | 20; 40; 50;<br>60; 80; 100 | 6.0 (61)<br>6.5 (68)<br>14.7 (150)<br>20.0 (204) | 227;<br>317; 320; 322 | 34CrMo4 |
| TU 1410-007-29416612-2005 | Steel cylinders for the transportation and storage of compressed industrial gases | 20; 25; 32; 40; 50<br>80; 97; 100;170 | 14.7 (150)<br>19.6 (200)<br>20.0 (204) | 219; 229 | 34CrMo4 |
| TU 1410-007-29416612-2005 | Steel cylinders for the on-board storage of compressed natural gas (methane) as motor fuel for vehicles | 18.5; 22.5; 23; 33; 34; 37; 39; 44; 50; 52; 53; 62; 65; 66; 70; 76; 77; 80; 86; 92; 100; 108; 114 | 20.0 (204) | 219; 229; 254; 322; 356; 406 | 34CrMo4 |
| TU 1410-702-0750107-2011 | Large-capacity seamless steel gas cylinders for $P_w \leq 24.5$ MPa (250 kgf/cm$^2$) | 80; 97; 100 | 24.5 (250) | 329 | 34CrMo4 |

# Appendix

## 01.
## PROCESS FLOWCHARTS



## 02.
## CHEMICAL COMPOSITION OF STEEL

# Steel melting and casting

**1** Scrap preparation

**2** Steel melter loading

**3** Melting

Electric arc furnace

**4** Secondary steelmaking in a ladle furnace

Ladle furnace

**5** Degassing

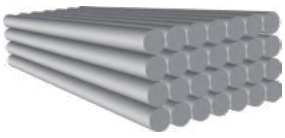
**6** Continuous steel casting. Round billet production only

**7** Cutting of continuous cast billets to length

Continuous steel casting machine

**8** Billet labeling and cooling

**9** Billet and heat inspection, storage or shipment



**CONTROLLED PARAMETERS**

Scrap weight, chemical composition and dimensions; fractional and chemical composition, moisture content and weight of materials; metal temperature; vacuum level, cooling modes, casting rate; cut quality and length; billet traceability, external surface, geometric dimensions, number of billets, macrostructure, and other.

# Seamless pipes

## Pipes rolling line with a PQF 10 3/4” continuous pipes rolling mill

**1** Billet heating in rotary furnace

**2** Billet piercing

**3** Hydro descaling

**4** Rolling in a continuous PQF mill

**5** Sizing in an extracting/sizing mill

**6** Reheating

**7** Hydro descaling

**8** Reduction in a hot stretch reduction mill

**9** Cooling

**10** Cutting

**11** Pipe straightening

**12** Nondestructive testing

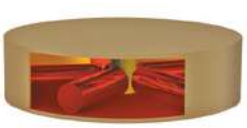
# Seamless pipes

## TPA 50-200 pipes rolling line with an Assel mill

**1** Incoming inspection of billets

**2** Billet breaking, visual inspection

**3** Billet heating in rotary furnaces



**7** Mandrel removal

**8** Pipe heating in a walking beam furnace

**9 a** Final pipe sizing in a three-roll sizing mill

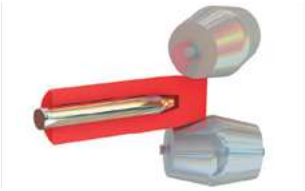
**12** Pipe straightening in a straightener

**13** Pipe end trimming and edge facing

**14** Quality control, turning
(for bearing tubes)

**4** Billet centering

**5** Billet piercing



**6** Shell rolling into pipes on Assel mills

**9 b** Pipe reduction in a 12-stand reducing-sizing mill

**10** Pipe cooling

**11** Heat treatment of pipe in pusher furnaces

(for bearing tubes and pipes for machinery)

**15** Pipe cutting to length, quality control

**16** Packaging, storage

# Seamless pipes

## Manufactured by hot extrusion in a 2.000-tonne line

**1** Turning
(for stainless steels)

**2** Billet cutting,
length measurement

**3** Drilling

**7** Glass lubricant application

**8** Expansion with a 650-tonne press

**9** Heating in vertical inductors

**13** Normalization
(if necessary)

**14** Chemical treatment

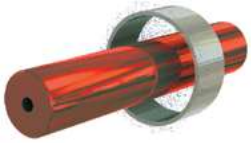
**15** Straightening

**19** Packaging, storage

**4** End facing, beveling, reaming

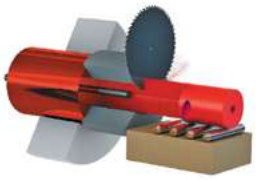
**5** Heating in horizontal inductors

**6** Hydro descaling

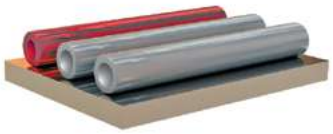


**10** Hydro descaling

**11** Extrusion in a 2.000-tonne extruder



**12** Cooling



**16** Pipe cutting to length and end cutting

**17** Beveling

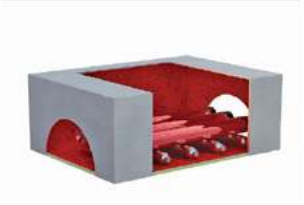
**18** Nondestructive testing, visual inspection

# Casing

**1** Heat treatment
(if necessary)

a) Heating
b) Quenching
c) Tempering
d) Sizing
e) Straightening

**a)** Heating



**b)** Quenching

**c)** Tempering

**d)** Sizing

**e)** Straightening

**2** Nondestructive testing

**3** Dimensional inspection, drift test

**4** Threading and thread inspection

**5** Coupling make-up

**6** Hydrostatic testing

**7** Length measurement, weighing

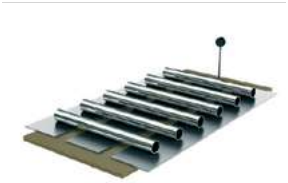
**8** Installation of protective parts

**9** Protective coating, labeling

**10** Packaging and storage

# Premium threading

**1** Dimensional control, drift test of pipes



**2** Thread cutting and inspection at the box end of pipes

**3** Screwing on couplings

**4** Hydrostatic testing

**5** Pin end threading and thread inspection

**6** Installation of protective parts

**7** Length measurement, weighing

**8** Protective coating

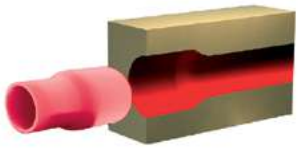
**9** Packaging, storage

# Tubing

**1** Green pipe
(incoming inspection)

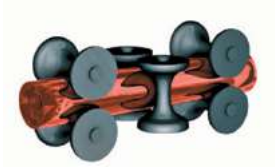
**2** Induction heating of pipe ends
(for pipes with upset ends)

**3** Upsetting
(for pipes with upset ends)



**c)** Tempering

**d)** Sizing
(for non-upset pipes)



**e)** Straightening

**8** Coupling make-up

**9** Hydrostatic testing

**10** Length measurement, weighing

**4** Heat treatment
(if necessary)

a) Heating
b) Quenching
c) Tempering
d) Sizing
e) Straightening

**a)** Heating

**b)** Quenching

**5** Nondestructive testing

**6** Dimensional inspection, drift test

**7** Threading and thread inspection

**11** Installation of protective parts

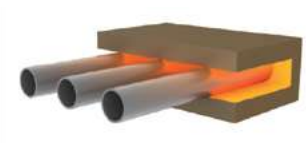
**12** Protective coating, labeling

**13** Packaging, storage

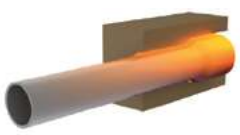
# Manufacture of drill pipes with weld-on tool joints

**1** Pipe body inspection

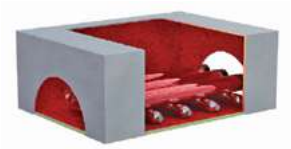
**2** Induction heating of pipe ends



**3** Upsetting



**c)** Tempering



**(d)** Straightening

**5** Magnetic particle inspection of pipe ends

**9** Tool joints
**(a)** Delivery
**b)** Incoming inspection
**c)** Preparation

**10** Friction welding of tool joints to drill pipe

**11** Post-weld heat treatment

**15** Pipe inspection, length measurement, weighing

**16** Thread protection, pipe painting, labeling

**17** Packaging, storage

**4** Heat treatment of pipe

a) Heating
b) Quenching
c) Tempering
d) Straightening

**a)** Heating

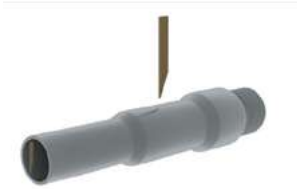
**b)** Quenching

**6** Nondestructive testing of pipe body

**7** Machining of pipe ends for welding

**8** Machining of upset parts

**12** Finishing of the external and internal surface of welded joints



**13** Welded joint testing

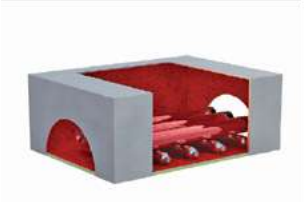
**14** Nondestructive testing and magnetic particle inspection of the weld zone

# Oil and gas line pipes (seamless)

**1** Heat treatment (if necessary)

a) Heating
b) Quenching
c) Tempering
d) Sizing
e) Straightening

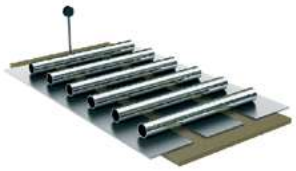
**a)** Heating



**b)** Quenching

**2** Nondestructive testing

**3** Visual and dimensional inspection



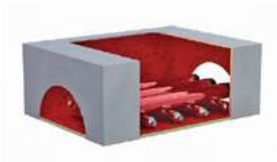
**4** Edge facing, beveling

**8** Length measurement, weighing

**9** Protective coating, labeling

**10** Packaging, storage

**c)** Tempering



**d)** Sizing

**e)** Straightening

**5** Hydrostatic testing

**6** Ultrasonic inspection

**7** Visual inspection, magnetic particle inspection of pipe end face and bevel

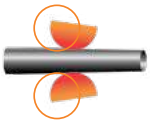
# General purpose cold-formed pipes

**1** Green pipe storage

**2** Pipe cold-forming process

The manufacturing process and the number of passes in each operation depend on the green pipes size, as well as the size and required mechanical properties of finished pipes

Rolling on cold pilgers



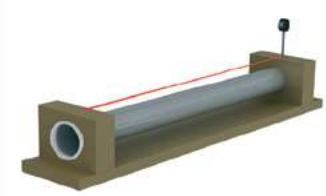
Drawing with a mandrel

Drawing without a mandrel

**6** Mechanical testing

**7** Cutting to length

**8** Dimensional inspection



**12** Length measurement, weighing

**13** Labeling, anti-corrosion protection (rust-preventive protection)

**3** Chemical treatment

**4** Heat treatment

**5** Straightening

**9** Surface inspection

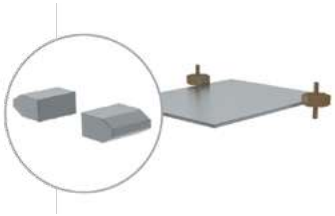
**10** Nondestructive testing
(if necessary)

**11** Steel grade control

# Longitudinal welded large diamenter pipes

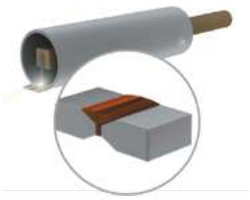
**1** Plate handling

**2** Milling of longitudinal edges of plate

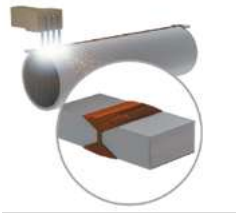


**3** Bending

**7** Inside welding



**8** Outside welding



**9** Removal of weld reinforcement at the ends and run-off tabs

**13** Expansion

**14** Pipe end finishing

**15** Hydrostatic testing

**19** Labeling and weighing

**20** Packaging, storage

**4** Post-bending

**5** Preparation, tack welding

**6** Run-off tab welding

**10** Preliminary visual inspection

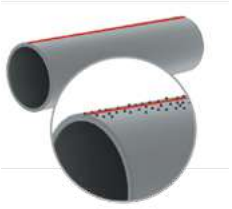
**11** Ultrasonic inspection

**12** X-ray inspection

**16** Ultrasonic inspection

**17** Radiography

**18** Visual inspection, magnetic particle inspection



# Electric-welded pipes

## Small- and medium-diameter pipes manufactured by TESA 73-219 (electric-weld pipes facility)

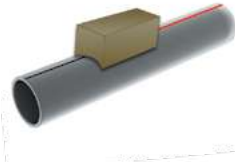
**1** Strip storage

**2** Strip preparation

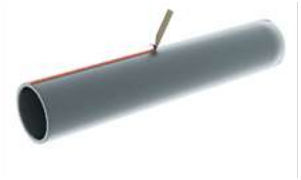
**3** Strip forming

**4** Pipe welding

**5** Local heat treatment of the welded joint



**6** External and internal flash removal



**7** Cooling, sizing and straightening of continuous pipe

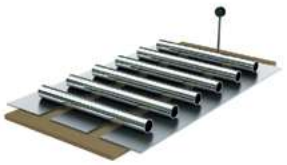
**8** Nondestructive testing of welded joint
(flaw detection)

**9** Cutting to length, end trimming

**10** Pipe end machining

**11** Hydrostatic testing

**12** Pipe inspection and weighing



**13** Packaging, storage

# Electric-welded pipes

## Medium-diameter pipes manufactured by TESA 168-530 (TMK-CPW)

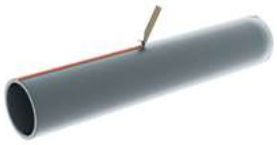
**1** Strip preparation

**2** Edge trimming

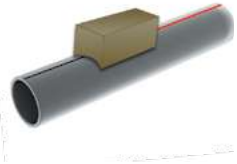
**3** Strip forming

**4** High-frequency welding

**5** External and internal flash removal



**6** Heat treatment of the weld seam

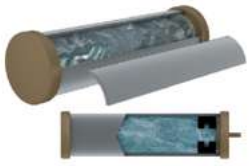


**7** Cooling, sizing and straightening of continuous pipes

**8** Saw cutting to length

**9** Pipe end finishing

**10** Hydrostatic testing



**11** Nondestructive testing of the welded joint

**12** Visual inspection, dimensional control, labeling of pipes

**13** Packaging, storage

# External anti-corrosion coating

**1** Incoming inspection of pipes
(visual)

**2** Preheating in a gas furnace

**3** Wheel blasting of the exterior surface of pipe with steel grit

**4** Purging pipe interior to remove dust

**5** Pipe surface preparation quality control
(visual)

**6** Heating. Chromating. Subsequent heating before coating

**7 a** Two-layer PE or PP coating
1) Adhesive application
2) Application of polyethylene
(or propylene)

**7 b** Three-layer PE or PP coating
1) Epoxy primer application
2) Adhesive application
3) Application of polyethylene
(or polypropylene)

**8** Water cooling of coated pipes

**9** Holiday testing

**10** Coating cut-back

**11** Final quality control of coated pipes
(visual)

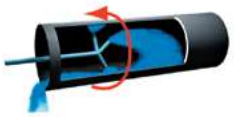
**12** Pipe labeling. Fixing protective parts. Pipe storage

# Internal anti-corrosion flow coating

**1** Incoming inspection of pipes

**2** Pipe heating

**3** Degreasing of internal surface of pipe



**4** Second heating of pipes

**5** Cleaning of internal pipe surface in wheel blasting machine No. 1

**6** Internal pipe surface cleaning quality control

**7** Cleaning of internal pipe surface in wheel blasting machine No. 2

**8** Internal surface purge

**9** Internal pipe surface preparation quality control

**10** Pipe coating
(in a paint booth)

**11** Precuring of internal pipe coating

**12** Induction heating of pipes

**13** Coating curing in a full polymerization chamber

**14** Pipe internal flow coating

**15** Pipe labeling.
Pipe storage with protective canvas caps

## Seamless pipes

| Standard | Steel grade (pipes grade) | Mass fraction of elements, % | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | C max | Si | Mn | S | P | Cu | Ni | Cr | Al | V |
| | | range | | | max | | | | | | |
| GOST 1050-88 | 10A | 0.07-0.14 | 0.17-0.37 | 0.35-0.65 | 0.02 | 0.02 | 0.3 | 0.3 | 0.25 | | |
| GOST 1050-88 | 20 | 0.17-0.24 | 0.17-0.37 | 0.35-0.65 | 0.040 | 0.035 | 0.25 | 0.25 | 0.25 | 0.050 | |
| GOST 1050-88 | 20A | 0.17-0.24 | 0.17-0.37 | 0.35-0.65 | 0.02 | 0.02 | 0.3 | 0.3 | 0.25 | | |
| GOST 4543-71 | 20Kh | 0.17-0.23 | 0.17-0.37 | 0.50-0.80 | Max 0.025 | Max 0.025 | 0.30 | 0.30 | 0.70-1.00 | | |
| GOST 4543-71 | 40Kh | 0.36-0.44 | 0.17-0.37 | 0.50-0.80 | Max 0.025 | Max 0.025 | 0.30 | 0.30 | 0.80-1.10 | | |
| GOST 4543-71 | 30KhPSA | 0.28-0.34 | 0.90-1.2 | 0.80-1.10 | Max 0.025 | Max 0.025 | 0.30 | 0.30 | 0.80-1.10 | | |
| GOST 19281 | 09G2S | 0.12 | 0.50-0.80 | 1.30-1.70 | 0.035 | 0.040 | 0.30 | 0.30 | 0.30 | | |
| API* Spec 5L/IS0 3183 | (B)<br>(X42)<br>(X46–X80) | 0.27<br>0.29<br>0.26 | | 1.15<br>1.25<br>1.35 | 0.030<br>0.030<br>0.030 | 0.030<br>0.030<br>0.030 | | | | | |
| TU 14-3-1128-2000 | 09G2S | 0.12 | 0.50-0.80 | 1.30-1.70 | 0.010 | 0.025 | 0.30 | 0.30 | 0.30 | | |
| GOST 632-80 | D | 0.40-0.50 | 0.17-0.37 | 0.70-1.00 | 0.045 | 0.045 | | | | | |
| GOST 632-80 | 32G2A (Ye) | 0.29-0.36 | 0.20-0.35 | 1.15-1.45 | 0.020 | 0.020 | 0.30 | 0.30 | 0.30 | | – |
| GOST 632-80 | L | 0.28-0.35 | 0.17-0.37 | 1.10-1.40 | 0.035 | 0.035 | | | | | 0.02-0.06 |
| GOST 632-80 | M | 0.28-0.35 | 0.17-0.37 | 1.10-1.40 | 0.035 | 0.035 | | | | | 0.06-0.12 |
| GOST 632-80 | R | 0.28-0.35 | 0.17-0.35 | 1.35-1.55 | 0.025 | 0.025 | | | | | 0.07-0.10 |

Content of elements not listed in the table:
TU 1381-214-0147016-02. steel 20F: nitrogen 0.01
TU 1308-226-0147016-02. steel 13KhFA: nitrogen 0.008
TU 1381-159-0147016-01. steel 09GSF: nitrogen 0.012
TU 1381-204-0147016-01. steel 09GSF and 12GF: niobium 0.02-0.06

## Welded pipes according to GOST 10704/10706

| Standard | Steel grade | Mass fraction of elements, % | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | C | Mn | Si | P | S | Cr | Ni | Cu | As | N |
| | | | | | max | | | | | | |
| GOST 380-2005 | St1kp | 0.06-0.12 | 0.25-0.50 | Max 0.05 | 0.04 | 0.05 | 0.3 | 0.3 | 0.3 | 0.1 | 0.01 |
| | St1Sp | 0.06-0.12 | 0.25-0.50 | 0.15-0.30 | 0.04 | 0.05 | 0.3 | 0.3 | 0.3 | 0.1 | 0.01 |
| | St2kp | 0.09-0.15 | 0.25-0.50 | Max 0.05 | 0.04 | 0.05 | 0.3 | 0.3 | 0.3 | 0.1 | 0.01 |
| | St2ps | 0.09-0.15 | 0.25-0.50 | 0.05-0.15 | 0.04 | 0.05 | 0.3 | 0.3 | 0.3 | 0.1 | 0.01 |
| | St2sp | 0.09-0.15 | 0.25-0.50 | 0.15-0.30 | 0.04 | 0.05 | 0.3 | 0.3 | 0.3 | 0.1 | 0.01 |
| | St3kp | 0.14-0.22 | 0.30-0.60 | Max 0.05 | 0.04 | 0.05 | 0.3 | 0.3 | 0.3 | 0.1 | 0.01 |
| | St3ps | 0.14-0.22 | 0.40-0.65 | 0.05-0.15 | 0.04 | 0.05 | 0.3 | 0.3 | 0.3 | 0.1 | 0.01 |
| | St3sp | 0.14-0.22 | 0.40-0.65 | 0.15-0.30 | 0.04 | 0.05 | 0.3 | 0.3 | 0.3 | 0.1 | 0.01 |
| GOST 9045-93 | 08Yu | Max 0.07 | Max 0.35 | Max 0.03 | Max 0.020 | Max 0.025 | | | | | |
| GOST 1050-88 | 08kp | 0.05-0.12 | 0.25-0.50 | Max 0.03 | 0.035 | 0.04 | 0.1 | 0.3 | 0.3 | 0.1 | 0.01 |
| | 08ps | 0.05-0.11 | 0.35-0.65 | 0.05-0.17 | 0.035 | 0.04 | 0.1 | 0.3 | 0.3 | 0.1 | 0.01 |
| | 08 | 0.05-0.12 | 0.35-0.65 | 0.17-0.37 | 0.035 | 0.04 | 0.1 | 0.3 | 0.3 | 0.1 | 0.01 |
| | 10kp | 0.07-0.14 | 0.25-0.50 | Max 0.07 | 0.035 | 0.04 | 0.15 | 0.3 | 0.3 | 0.1 | 0.01 |
| | Yups | 0.07-0.14 | 0.35-0.65 | 0.05-0.17 | 0.035 | 0.04 | 0.15 | 0.3 | 0.3 | 0.1 | 0.01 |
| | 10 | 0.07-0.14 | 0.35-0.65 | 0.17-0.37 | 0.035 | 0.04 | 0.15 | 0.3 | 0.3 | 0.1 | 0.01 |
| | 15 | 0.12-0.19 | 0.35-0.65 | 0.17-0.37 | 0.035 | 0.04 | 0.25 | 0.3 | 0.3 | | |
| | 20 | 0.17-0.24 | 0.25-0.50 | 0.17-0.37 | 0.035 | 0.04 | 0.25 | 0.3 | 0.3 | | |
| GOST 19281-89 | 16GS | 0.12-0.18 | 0.9-1.2 | 0.4-0.7 | 0.035 | 0.04 | 0.3 | 0.3 | 0.3 | | |
| TU 14-1-2551-76 | 08G2SF | Max 0.12 | 1.2-1.6 | 0.4-0.6 | 0.025 | 0.01 | | | | | |

## Bearing tubes according to GOST 800-78

| Steel grade | Mass fraction of elements, % | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | C | Si | Mn | Cr | S | P | Cu | Ni | Ni + Cu |
| | | | | | max | | | | |
| ShKh-15 | 0.95-1.05 | 0.17-0.37 | 0.20-0.40 | 1.30-1.65 | 0.020 | 0.027 | 0.25 | 0.30 | 0.50 |
| ShKh-15 SG | 0.95-1.05 | 0.40-0.65 | 0.90-1.20 | 1.30-1.65 | 0.020 | 0.027 | 0.25 | 0.30 | 0.50 |
| ShKh-4 | 0.95-1.05 | 0.15-0.30 | 0.15-0.30 | 0.35-0.50 | 0.020 | 0.027 | 0.25 | 0.30 | 0.50 |

## Seamless pipes for the oil refining and petrochemical industries (petroleum cracking pipes) according to GOST 550-75

| Steel grade | Mass fraction of elements, % | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | C | Si | Mn | Cr | S | P | Ni | Cu | Mo | V | Ti |
| | | | | | max | | | | | max | |
| 10 | 0.07-0.14 | 0.35-0.65 | 0.17-0.37 | Max 0.15 | 0.040 | 0.035 | 0.30 | 0.30 | – | – | – |
| 20 | 0.17-0.24 | 0.35-0.65 | 0.17-0.37 | Max 0.25 | 0.025 | 0.030 | 0.30 | 0.30 | – | – | – |
| 10G2 | 0.07-0.15 | 1.20-1.60 | 0.17-0.37 | Max 0.30 | 0.035 | 0.035 | 0.30 | 0.30 | – | – | – |
| 12KhM | 0.09-0.16 | 0.40-0.70 | 0.17-0.37 | 0.40-0.70 | 0.025 | 0.030 | 0.30 | 0.20 | 0.40-0.60 | | |
| 15Kh5 | Max 0.15 | Max 0.50 | Max 0.50 | 4.50-6.00 | 0.025 | 0.030 | – | – | – | – | – |
| 15Kh5M | Max 0.15 | 0.30-0.50 | 0.30-0.50 | 4.50-6.00 | 0.025 | 0.030 | 0.60 | 0.20 | 0.45-0.60 | 0.050 | 0.030 |
| 12Kh8 | Max 0.12 | o o 0 01 o | 0.17-0.37 | 7.5-9.0 | 0.030 | 0.035 | 0.40 | 0.25 | – | – | – |

## Seamless corrosion-resistant steel pipes (stainless steel pipes)

| Steel grade (alloy) | Mass fraction of elements, % | | | | | | | | | | | | | | Groups* | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | C | Si | Mn | Cr | Ni | Ti | Al | W | Mo | Nb | V | Fe | S | P | | | |
| | | | | | | | | | | | | | max | | | | |
| | | | | | | | | Steels | | | | | | | | | |
| 40Kh9S2 | 0.35-0.45 | 2.0-3.0 | Max 0.8 | 8.0-10.0 | – | – | – | – | – | – | – | Basic metal | 0.025 | 0.025 | – | 0 | 0 |
| 20Kh13 | 0.16-0.25 | Max 0.8 | Max 0.8 | 12.0-14.0 | – | – | – | – | – | – | – | Basic metal | 0.025 | 0.02 5 | 0 | – | |
| 25Kh13N2 | 0.20-0.30 | Max 0.5 | 0.8-1.2 | 12.0-14.0 | 1.5-2.0 | – | – | – | – | – | – | Basic metal | 0.025 | 0.025 | 0 | – | – |
| 08Kh17T | Max 0.08 | Max 0.8 | Max 0.8 | 16.0-18.0 | – | 5C-0.80 | – | – | – | – | – | Basic metal | 0.025 | 0.02 5 | 0 | 0 | – |
| 15Kh26T | Max 0.15 | Max 1.0 | Max 0.8 | 24.0-27.0 | – | 5C-0.90 | – | – | – | – | – | Basic metal | 0.025 | 0.025 | 0 | 0 | |
| 08Kh17N5M3 | 0.06-0.10 | Max 0.8 | Max 0.8 | 16.0-17.5 | 4.5-5.5 | – | – | – | 3.0-3.5 | – | – | Basic metal | 0.020 | 0.020 | 0 | – | – |
| 08Kh17N6T | Max 0.08 | Max 0.8 | Max 0.8 | 16.0-18.0 | 5.5-6.5 | – | – | – | Boron | Max 0.003 | – | Basic metal | 0.020 | 0.020 | 0 | – | – |
| 08Kh10N20T2 | Max 0.08 | Max 0.8 | Max 2.0 | 10.0-12.0 | 18.0-20.0 | 1.5-2.5 | Max 1.0 | – | – | – | – | Basic metal | 0.030 | 0.030 | 0 | – | – |
| 09Kh14N16B | 0.07-0.12 | Max 0.6 | 1.0-2.0 | 13.0-15.0 | 14.0-17.0 | – | – | – | – | 0.9-1.3 | – | Basic metal | 0.020 | 0.020 | – | 0 | 0 |
| 17Kh18N9 | 0.13-0.21 | Max 0.8 | Max 2.0 | 17.0-19.0 | 8.0-10.0 | – | – | – | – | – | – | Basic metal | 0.020 | 0.020 | 0 | – | – |
| 08Kh18N10T | Max 0.08 | Max 0.8 | Max 1.5 | 17.0-19.0 | 10.0-11.0 | 5C-0.6 | N 0.05 | – | – | – | – | Basic metal | 0.020 | 0.020 | 0 | 0 | – |
| 08Kh18N10 | Max 0.08 | Max 0.8 | Max 2.0 | 17.0-19.0 | 9.0-11.0 | – | – | – | – | – | – | Basic metal | 0.020 | 0.020 | 0 | 0 | – |
| 07Kh15N4M2T-PT | 0.05-0.1 | Max 0.60 | 0.2-0.7 | 14.0-16.0 | 3.5-4.5 | 0.15-1.35 | 0.2 + Cu 0.2 | – | 1.5-2.0 | – | – | Basic metal | 0.02 | 0.02 | | | |
| 06Kh18N11 | Max 0.03 | Max 0.4 | Max 0.4 | 17.0-19.0 | 11.5-13.0 | Max 0.005 | – | – | – | – | 1.4-1.7 | Basic metal | 0.020 | 0.020 | 0 | – | – |
| | | | | | | | | Alloys | | | | | | | | | |
| KhN35VT | Max 0.12 | Max 0.6 | 1.0-2.0 | 14.0-16.0 | 34.0-38.0 | 1.1-1.5 | – | 2.8-3.5 | – | – | – | Basic metal | 0.020 | 0.030 | – | – | 0 |
| 20Kh23N18 | Max 0.20 | Max 1.0 | Max 2.0 | 22.0-25.0 | 17.0-20.0 | – | – | – | – | – | – | Basic metal | 0.020 | 0.035 | – | 0 | 0 |
| KhN70Yu | Max 1.0 | Max 0.8 | Max 0.3 | 26.0-29.0 | Basic metal | – | 2.80-3.50 | – | – | – | – | Max 1.0 | 0.012 | 0.015 | – | 0 | 0 |
| Kh70MFV | Max 0.02 | Max 0.10 | Max 0.5 | Max 0.3 | Basic metal | Max 1.5 | – | 0.10-0.45 | 25.0-27.0 | – | 1.4-1.7 | Max 0.8 | 0.012 | 0.015 | 0 | – | – |
| KhN55VMTKYu | 0.04-0.10 | Max 0.5 | Max 0.5 | 9.0-12.0 | Basic metal | 1.4-2.0 | 3.6-4.5 | 4.5-6.5 | 4.0-6.0 | – | 0.2-0.8 | Max 5.0 | 0.010 | 0.015 | – | – | 0 |
| KhN65MVU | Max 0.02 | Max 0.10 | Max 1.0 | 14.5-16.5 | Basic metal | – | – | 3.0-4.5 | 15.0-17.0 | – | – | Max 0.5 | 0.012 | 0.015 | 0 | – | – |

* Groups I – corrosion-resistant, II – heat resistant, III – creep resistant.

Pipes can be made of steel grades not listed in the table within limits set out in GOST 5632-72 (12Kh18N10T, 10Kh7N13M2T, 4S33-VN and others).

## Seamless pipes for the thermal power industry (pipes for power generation)

| Steel grade | Mass fraction of elements, % | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | C | Si | Mn | Cr | Ni | Mo | V | Other | max | | |
| TU 14-ZR-55-2001 | | | | | | | | | | | |
| 20 | 0.17-0.24 | 0.17-0.37 | 0.35-0.65 | Max 0.25 | Max 0.25 | – | – | – | 0.30 | 0.025 | 0.030 |
| 15GS | 0.12-0.18 | 0.70-1.00 | 0.90-1.30 | Max 0.30 | Max 0.30 | – | – | – | 0.30 | 0.025 | 0.035 |
| 15KhM | 0.10-0.15 | 0.17-0.37 | 0.40-0.70 | 0.80-1.10 | Max 0.25 | 0.40-0.55 | – | – | 0.20 | 0.025 | 0.035 |
| 12Kh1MF | 0.10-0.15 | 0.17-0.37 | 0.40-0.70 | 0.90-1.20 | Max 0.25 | 0.25-0.3 5 | 0.15-0.30 | – | 0.20 | 0.025 | 0.025 |
| 15Kh1M1F | 0.10-0.15 | 0.17-0.37 | 0.40-0.70 | 1.10-1.40 | Max 0.25 | 0.90-1.10 | 0.20-0.35 | – | 0.25 | 0.025 | 0.025 |
| 10Kh9MFB-Sh | 0.08-0.12 | Max 0.50 | 0.30-0.60 | 8.60-10.00 | Max 0.70 | 0.60-0.80 | 0.10-0.20 | Nb 0.1–0.2 | 0.3 | 0.015 | 0.03 |
| 12Kh2MFSR | 0.08-0.15 | 0/40-0.70 | 0.40-0.70 | 1.60-1.90 | Max 0.25 | 0.50-0.70 | 0.20-0.35 | B 0.002-0.005 | 0.25 | 0.025 | 0.025 |
| 12Kh11V2MF | 0.09-0.14 | Max 0.50 | 0.50-0.80 | 10.0-12.0 | Max 0.60 | 0.60-0.90 | 0.15-0.30 | W 1.17–2.20 | 0.30 | 0.025 | 0.025 |
| 12Kh18N12T | Max 0.12 | Max 0.80 | 1.00-2.00 | 17.0-19.0 | 11.0-13.0 | – | – | (C – 0.02)x5 max 0.70 | 0.30 | 0.020 | 0.035 |
| 10Kh13G12BS2N2D2 | 0.06-0.10 | 1.80-2.20 | 12.00-13.50 | 11.50-13.00 | 1.80-2.50 | – | – | Nb 0.6–1.0 | 2.0-2.5 | 0.020 | 0.030 |
| DIN 17175; EN 10216-2 | | | | | | | | | | | |
| St 3 5.8 | 0.17 | 0.10-0.3 5 | 0.40-0.80 | – | – | – | – | – | – | 0.04 | 0.04 |
| St 45.8 | 0.21 | 0.10-0.35 | 0.40-0.80 | – | – | – | – | – | – | 0.04 | 0.04 |
| 17MP4 | 0.14-0.20 | 0.20-0.40 | 0.90-1.20 | 0.3 | – | – | – | – | – | 0.04 | 0.04 |
| 19MP5 | 0.17-0.22 | 0.30-0.60 | 1.00-1.30 | 0.3 | – | – | – | – | – | 0.04 | 0.04 |
| 15Mo3 | 0.12-0.20 | 0.10-0.3 5 | 0.40-0.80 | – | – | 0.25-0.3 5 | – | – | – | 0.035 | 0.035 |
| 13CrMo44 | 0.10-0.18 | 0.10-0.35 | 0.40-0.70 | 0.70-1.10 | – | 0.45-0.65 | – | – | – | 0.035 | 0.035 |
| ASTM A106/A106M | | | | | | | | | | | |
| Grade A | 0.25 | 0.10 | 0.27-0.93 | 0.40 | 0.40 | 0.15 | 0.08 | – | 0.40 | 0.048 | 0.058 |
| Grade B | 0.30 | 0.10 | 0.29-1.06 | 0.40 | 0.40 | 0.15 | 0.08 | – | 0.40 | 0.048 | 0.058 |
| Grade C | 0.35 | 0.10 | 0.29-1.06 | 0.40 | 0.40 | 0.15 | 0.08 | – | 0.40 | 0.048 | 0.058 |

API* - Effective March 17, 2022, the API Monogram/APIQR Program has ceased offering certification services within the Russian Federation in response to restrictions on financial and business activities imposed by the U.S. and Russian governments. As a result, now all TMK facilities are not authorized to apply the API Monogram on their products.

TMK facilities were holding API license continuously for over 25 years. They have vast experience of manufacturing material in accordance with API standards to the clients worldwide. Since 2003, the TMK facilities have produced more than 3 million metric tons of casing, tubing, drilling and linepipes as per API Standards and marked with the API monogram.

TMK product's quality and reliability are demonstrated by years of supply and service customers.

However, now the TMK facilities are still permitted to state that their products meet or comply with an API standard or specification provided that they do meet the requirements in the API standard or specification. As previously, the TMK facilities guarantee full compliance with the requirements of the API Standards and the quality of supplied products.

To provide additional confidence to our clients, in the summer of 2022 the TMK facilities have been audited by AJA Registrars CIS ltd. and found to be in accordance with requirements API Spec. 5CT, API Spec. 5L, API Spec. 5DP & API Spec. Q1.

During a manufacturing of customer orders a third part inspection can be involved to re-assure that all material is produced in strict accordance with API Standards and customer specifications. A utilization of third part testing laboratories can be provided as well.

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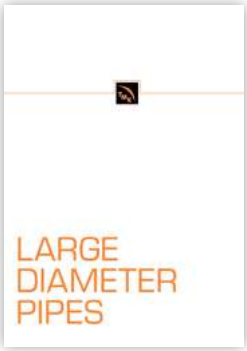
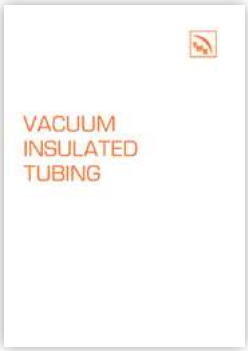



Large Diameter Pipes




Insulated tubing (vacuum (VIT) and non-vacuum)


Stainless Steel Pipes


Premium connections TMK UP